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COMMUNICATIONS SUPPORT PROCESSOR (CSP)

Informatics General Corporation

Gene Konopik and Darrel Wilson

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SECTION 1 Introduction

1.1 Purpose

The purpose of this technical report is to present the advanced capabilities developed for the Communications Support Processor (CSP) during the previous year and to discuss the impact these capabilities will have on the system and its users.

1.2 Scope

This document covers the following aspects of CSP:

- o a descriptive discussion of those enhanced capabilities developed and/or analyzed.
- o a discussion of system support tasks, including installation support, configuration management, software quality assurance and software maintenance.

1.3 Report Organization

The CSP technical report is organized into four sections. Section one serves as a general introduction to the CSP system: its development, incorporation, goals, and status. Section two describes the CSP capabilities and accomplishments. Section three itself consists of three parts. Part one of section three details the technical performance of the CSP. Included in this discussion are the following: operating system upgrade; hardware configuration analysis; message distribution clerk analysis; multiplexer interface analysis; history and intercept capabilities; ancillary control processor analysis; automated message recall and retransmission; and direct software interface to AUTODIN. This second part also describes the CSP system support functions. They include: CSP installation support; configuration management; software quality assurance; computer programs; and software maintenance. The second part of section three details on-site maintenance at those CSP sites which have elected such support. The third part of section three includes a description of all deliverables included under this phase of the CSP Enhancements Contract. Finally, section four summarizes all conclusions and recommendations for the CSP.

1.4 Background

1.4.1 Initial Development

The Air Force Intelligence Service (AFIS), Directorate of Intelligence Data Management (IND) is manager of the Air Force Automatic Data Processing System (ADPS) for Intelligence Data Handling Systems (IDHS) - better known as ADPS-90. The ADPS-90 manager uses the

CUBIC program as an orderly and systematic approach for developing, implementing, disseminating, maintaining and supporting certain common software for use by Air Force and other qualified agencies/activities that use AN/GYQ-21(V) minicomputers.

CUBIC, the Common User's Baseline for the Intelligence Community is a centralized management program for software design, development, maintenance and control, aimed at eliminating redundant software efforts by providing a set of standard systems/subsystems. CUBIC has also come to be known as the software architecture philosophy used in managing these software systems. The CUBIC philosophy entails active user determination of functional requirement priorities, centralized software development and maintenance, emphasis on modular software design lending itself to transportability, and software design that can be adapted to meet site specific needs.

The CSP was developed at Headquarters Strategic Air Command (SAC) as part of the Operational Intelligence Support System (OISS). In June 1978, the CSP was tested under the provisions of DoD Manual 5030.58 and accredited/certified by Defense Intelligence Agency (DIA)/Defense Communications Agency (DCA) as a DSSCS/GENSER AUTODIN automated message processing exchange (AMPE). The CSP has been operational at HQ SAC since September 1978.

1.4.2 CUBIC Incorporation

AFIS/IND as the USAF ADPS-90 manager was aware of other intelligence user requirements to automate Special Security Offices (SSOs). Therefore in late 1978 AFIS adopted CSP as a CUBIC entity. This meant that CSP could be supported for various Air Force requirements and dovetailed with the HQ SAC effort to provide a single software baseline. CUBIC CSP was installed/accredited at HQ MAC in May 1979 and has been operational since June 1979. Subsequently CSP has been installed under the CUBIC program at PACOM Data Services Center (PDSC), Hawaii and at the U.S. Army Training and Doctrine Command Facility (TRADOC) TCATA, Ft. Hood, Texas.

In February 1980, a working group comprised of representatives from DIA, AFIS, RADC, SAC, and PDSC recommended to the Assistant Secretary of Defense for Command, Control Communications and Intelligence (C3I) that CSP be adopted as an interim standard for Special Security Office (SSO) Fixed Base Telecommunications automated message handling systems. This recommendation, which was subsequently approved, included appointment of AFIS/IND as executive agent for life cycle management of CSP software. In November 1980, the Director of DIA and the Air Force Assistant Chief of Staff/Intelligence signed the official CSP executive agent agreement.

1.4.3 Contract Goals

The contract goals were established to provide the following accomplishments in a timely manner:

- o CSP Operating System Upgrade - This included determination of the modifications required to convert the CSP operating system to RSX-11M+.
- o CSP Hardware Configuration\-\This included an analysis of the modifications required to facilitate migration of the CSP to a smaller, less expensive hardware configuration, such as the Digital Equipment Corporation (DEC) PDP-11/24.
- o Message Distribution Clerk\-\This task included an analysis of the feasibility of optionally supporting the Message Distribution Clerk (MDC) functions via a single screen CRT device conforming to DODIIS criteria for standard alphanumeric terminal.
- o Multiplexer Interface\-\This task included an analysis of the capability to optionally interface to all communications and peripheral devices currently supported by the baseline CSP (independently of the BR1569 or BR1731 multiplexer) by utilizing off-the-shelf vendor interface devices.
- o History and Intercept Capabilities\-\This task included an analysis of the capability of the CSP to optionally provide the system history and intercept capabilities, utilizing disk recording media versus magnetic tape.
- o Ancillary Control Processor\-\This task included an analysis of the capability to utilize the DEC Ancillary Control Processor (ACP) concept to improve processing efficiency and reduce memory requirements for the CSP baseline system.
- o Message Recall\-\This task included an analysis of the software required for the CSP to enable automatic message recall and retransmission to designated/controlled lines based upon communications interfaces to the CSP.
- o Direct AUTODIN Interface\-\ This analysis examined the feasibility and work required to develop an interface to the AUTODIN ASC using only software independently of special AUTODIN interface devices such as TLC, AID or INTEQ.

- o CSP Site Support\-\This involved six phases of CSP installation: Preinstallation support; installation configuration; software installation, test and checkout; user familiarization and training; enhancement/update distribution; and installation configuration management.
- o Training\-\This dealt with providing training at the contractor's facility (or on-site) for site communications operators and programmers, as required to support installation of the CSP. Additionally, training materials were provided to the users.
- o CSP Software Inventory\-\A software inventory had to be maintained of all CSP software modules which can be configured into a CSP based system. A site unique inventory must also be maintained for each site with CSP software installed.
- o AFIS Support\-\A central repository for the processing of all system enhancements and problem reports must be maintained. All site unique requirements must be evaluated. Each enhancement must be reviewed upon completion, and when accepted by the Air Force and made part of the baseline, shall be made available to all sites.
- o Software Engineering\-\All computer software delivered in the course of this contract shall be implemented in accordance with RADC Software Development Specification CP 0787796100E, dated 30 May, 1979.
- o Configuration Management\-\This task ensured adherence to well defined procedures for implementing additions or modifications to the CSP standard system.
- o Software Quality Assurance\-\This task resulted in the development and implementation of a Quality Assurance Plan. This assured compliance with all software requirements of the contract.
- o Computer Programs\-\The objective of this item to ensure that the most current version of all CSP software was delivered to AFIS/IND for distribution.
- o Software Maintenance\-\This task included work which provided centralized maintenance support for all CUBIC sites.
- o On-site Maintenance\-\This task provided on-site software maintenance support to sites requesting this level of CUBIC support.

1.4.4 System Status

The CSP has been in operation for over 5 years. Since its initial operational date in September 1978, the system has compiled an impressive record of accomplishments. CSP down-time is recorded in terms of minutes-per-week; it has proven itself to be highly reliable in terms of protecting secure traffic; and it has never lost a message as a result of system design or software deficiencies.

CSP Release I as implemented at HQ SAC in 1978 was derived from the DIA SPINTCOM facility software. However, functional, security and hardware changes required a 60% rewrite of the original system. Moreover, the current architecture bears little resemblance to SPINTCOM design. CSP Release II as implemented under CUBIC auspices may almost be considered third generation, since many changes to improve modularity and transportability have been made. As a part of the CUBIC program, the CSP has been installed on a variety of different hardware configurations; and as a result, has become a modular system, readily configurable for installation into various environments.

CSP is currently installed at twelve locations representing the Air Force, Army and Navy. Applications range from a full telecommunications center automation system to a front end processor for an analyst support system.

SECTION 2 Communication Support Processor System Description

2.1 Functional Description

The Communications Support Processor (CSP) is a computer system designed to automate the functions of a Telecommunications Center (TCC) and serve as a communications front-end processor for analyst computer systems. It can best be described as a collection of application and system level computer programs, designed to execute as a coordinated whole, for the express purpose of accomplishing store and forward operations of record copy message traffic. The primary tasks of the CSP system consist of reception of message traffic, validation of proper format, determination of required routing and delivery to the intended recipients.

Regardless of size, each TCC is served by a "standard" CSP configuration as depicted in Figure 2-1. However, the components which comprise the standard system will vary to meet the operational requirements of the organization served.

The standard system consists of a basic AN/GYQ-21(V) system with the following components: CPU, memory (minimum 192K), system console, two 800 BPI tape drives, two 80MB disk drives, line printer, appropriate communications interfaces, Analytics TLC-100 or equivalent, and one or more Univac 1652 (OJ-389) terminals. Software required for the standard system is the CUBIC CSP baseline package and the latest version of the IAS operating system.

2.2 Summary of Capabilities

CSP can best be described as a collection of application and system level computer programs, designed to execute as a coordinated system, for the express purpose of store and forward operations on record copy message traffic. While there are many ancillary functions of CSP, its primary task consists of reception of message traffic, validation of proper format, and determination of required routing.

In and of itself, CSP is merely a message management system. Stripped of all ancillary processing, CSP is a system which reliably moves data from one point to another. It is this ancillary software, however, that defines the characteristics of the data being moved, and that operations are performed along the way.

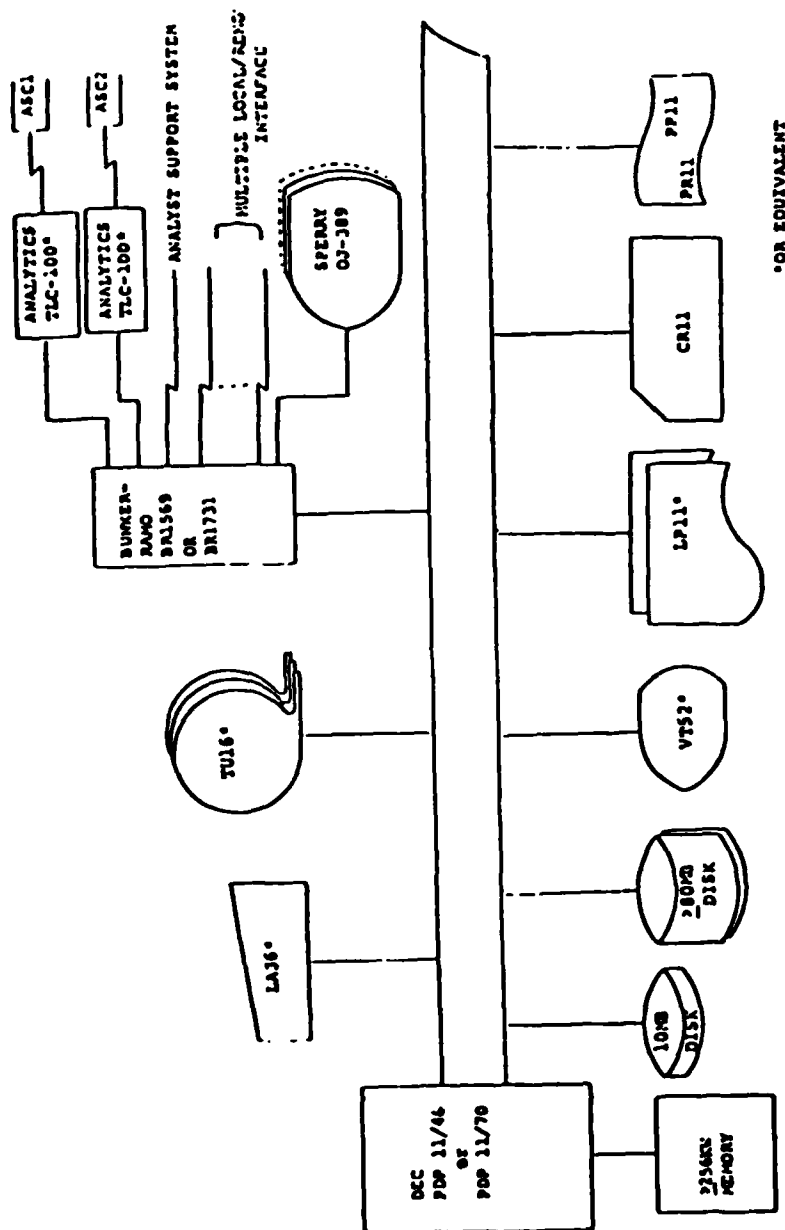


Figure 2-1 Optimum CSP Hardware Configuration

Some of the basic functions and capabilities provided by CSP are listed below:

- o Mode I AUTODIN R/Y Interface
- o Mode II Interface Support
- o Variety of Interfaces and Protocols Supported
- o Input and Output Security Check
- o Message Format Validation
- o Message Journalization and Audit Trail
- o Message Review and Dissemination
- o Routing Line Segregation
- o Classification Stamping of Hardcopy Output
- o Message Edit/Generation
- o Output Message Logging
- o Alternate Message Routing
- o Online Message Retrieval
- o Real-time Status Display
- o DD Form 173 support with Plain Language Address Expansion
- o Fully Automated Routing and Dissemination

2.3 Summary of Development Accomplishments

A detailed description of the work performed on each of the SOW items is presented in Section 3 of this technical report. This paragraph serves as a summary of these developments.

Several analysis tasks were undertaken during the first phase of this work effort. These included operating system upgrade, hardware configuration analysis, OJ-389 and multiplexer interface alternatives, history and intercept capabilities, ancillary control processors, automated message recall and retransmission, and Direct AUTODIN

Interface analysis tasks. This resulted in the publication of numerous technical reports which were made available to all CSP users for comment.

Four of these analysis efforts resulted in a decision by the users either to delay the capability or not to implement it at all. These are the operating system conversion to RSX-11M, implementation of ACPs, implementation of automated message recall and retransmission based on a service message, and the replacement of the TLC100 with a software interface to AUTODIN.

Several others, however, did result in the development of a new capability. These were all in the form of an option to the user as opposed to a replacement. For example, the user has the option of using either an OJ-389 or a Delta Data 8252T terminal. Additionally, the alternative will exist to use either a BR1569/BR1731 multiplexer or the new DV11 multiplexer software. A major new capability that also uses this philosophy is the history and intercept functions. The user now has the alternative of operating with two disks, a disk and a tape, or two disks and tape. This approach allows a great deal of flexibility in configuring a system.

This fiscal year also saw the installation of two new CSPs, at USAREUR, Heidelberg, Germany and at USAFE TFC, also in Germany. Several site surveys were also performed which is an indication of the number of new sites which are projected for the near term future.

SECTION 3 Technical Performance and Support

This section discusses all actions taken or underway which involve technical analysis, development or support. The results of these actions may be the completed development of the desired capability or the publication of a technical report detailing the steps which will be necessary to develop that capability.

Subsections below describe the task, outline the objectives of the effort, detail specific accomplishments and provide a discussion of the impact of development efforts on the CSP system.

3.1 SOW Tasks

This section describes all those tasks identified in the Statement of Work for the CSP Enhancements Contract. These tasks include analysis and development of advanced capabilities as well as CSP support items.

3.1.1 Operating System Upgrade (SOW 4.1.1)

3.1.1.1 Objective

The objective of this task was to determine the feasibility and impact of converting CSP to the RSX-11M+ operating system from the currently used IAS version. IAS has been a reliable operating system, capable of operating in any one of three modes: real-time, multiuser, or time-sharing. However, Digital Equipment Corporation (DEC) has projected discontinuance of support for IAS as early as 1986. In addition, IAS is 36 percent more costly to install than the RSX-11M+ version.

The analysis was directed towards weighing the advantages that might be obtained by conversion to RSX-11M+, including I & D space support, Supervisor Mode Libraries, and improved I/O performance; against possible disadvantages such as having to rewrite all handler code and possibly experiencing adverse user impact during conversion.

3.1.1.2 Accomplishments

Informatics completed an analysis of CSP conversion to the RSX-11M+ operating system by April, 1983 and presented its findings in Technical Report 83-43110-05, "Communications Support Processor Operating System Upgrade and Hardware Configuration Interim Technical Report". This document discussed the advantages and disadvantages of a system upgrade, concentrating on the incompatibilities between IAS and RSX-11M+. Addressed areas were: device handlers, directive differences, utilities, SYSGEN procedures, performance considerations, hardware considerations, and user impact.

3.1.1.2.1 Device Handlers

The analysis of an operating system upgrade highlights the fact that under RSX-11M+ device handlers are treated as processes within the Executive, rather than separate tasks as is the case under IAS. An advantage of this difference is that the Executive does validation of a request before passing the request on to the handler. Some reduction in code in the handlers themselves is also achieved, since the Executive determines the type of request and sends it to the appropriate point in the handler software.

Because handler tasks are privileged tasks under IAS, and CSP uses these directives frequently, Informatics concluded that considerable effort would be necessary to accommodate these differences in developing the code conversion. Handlers unique to CSP, such as the Bunker Ramo multiplexer handler; the Univac terminal pseudo handler; the DDCMP pseudo handler; the DV-11 handler and the CSP handler interface to the message file would all require a complete code rewrite. This effort would involve approximately 22,000 lines of MACRO-11 code over an extended time.

3.1.1.2.2 System Directive Differences

Numerous system directive differences exist between IAS and RSX-11M+. While approximately 35 new system directives would be available under RSX-11M+, 14 have been deleted, including some used by CSP. Another 37 system directives have been modified and perform differently between the two operating systems.

It should also be noted, as indicated in the Technical Report, that Monitor Console Routines also differ under RSX-11M+. Most involve the addition of MCR commands or renaming the commands. Four commands are deleted under RSX-11M+:

- o MEM - unlocks tasks from memory which were locked by the Executive due to a memory parity error.
- o PWD - change or create a password.
- o UTL - allows user to set parameters for timesharing scheduler.
- o WHO - indicates which terminals are logged on.

3.1.1.2.3 System Utilities

The analysis determined that the utility routines remained basically the same under RSX-11M+ with the exception of the Volume Preservation Utility, PRESRV. This utility, normally used to save a system disk or master disk, allows the user to create copies of volumes

to disk; magnetic tape; DECtapes or cassette tape. Unlike DSC or BRU under IAS, PRESRV copies all blocks, including bad ones, to or from the selected medium.

3.1.1.2.4 SYSGEN Procedures

Several features associated with the RSX-11M+ operating system enhance the system generation process:

- o Full Functionality Executive. Options available allow use of numerous features, such as shadow recording, resource accounting, console driver support, batch processor support, virtual terminal support and others.
- o Autoconfiguration. Under the proper conditions, this feature will automatically determine the correct hardware configuration of the host system. SYSGEN procedures are also facilitated because SYSGEN uses the results of the Autoconfiguration to answer the Choosing Peripheral Configuration section.
- o SYSGEN Menu. This feature allows the system user to resume a partially completed SYSGEN at a specified section or to perform selected individual sections of the generation.

3.1.1.2.5 Performance Considerations

Three characteristics of the RSX-11M+ operating system provide features which would be beneficial to system performance. Of the three, the improved I/O speeds available with the upgraded operating system are the most significant. Hardware that utilizes the new Digital Storage Architecture (DSA), such as the UDA50 Controller and the RA60/80/81 disk drives, are supported by RSX-11M+. High data handling rates (3Mb/Sec), high density recording, improved seek times, and simultaneous operations to all system disks are possible through control of the intelligence resident in the UDA50. A second feature, virtual terminal support, eliminates the need for a physical terminal for communications between the system and the job being performed. Thirdly, supervisory mode libraries can effectively expand the available usable memory by allowing mapping into the Supervisor Mode I & D space.

3.1.1.2.6 Hardware Considerations

Although RSX-11M+ will support an extensive hardware suite not supportable through IAS, there are many existing equipments that cannot be supported by RSX-11M+. Among the latter are: the LA30, LA33, and the VT50 family of console terminals; the RK05, RPR02,

RX01/2, and RM04 disk drives; the TU60 and TS03 tape drives and the CDAll-A/E card readers; along with many of the common disk controllers, tape controllers, clocks and communications devices.

3.1.1.2.7 User Impact

Although conversion to the RSX-11M+ operating system would present numerous advantages, especially longevity, over the present IAS version, the initial impact upon the user community would be significant, and largely negative. At some sites, for example, such as those with both a CSP and a MAXI installation, both IAS and RSX-11M+ would exist necessitating that the system operator be familiar with both systems. All conversions would require that the site be re-licensed for the new operating system. All system operators and on-site programming personnel would need extensive training in the new operating system. And finally, for a considerable period of time, both AFIS and the contractor would need to maintain support for both the old and the new operating systems since not all sites would be converted. This dual management burden would add to the overhead required to provide CSP support to all users.

3.1.1.3 Discussion

Many advantages are available through the RSX-11M+ operating system which are not available with IAS. These advantages, however, would be gained only at the expense of extensive software development efforts, a heavy training requirement, significant initial user impact and increased management overhead. Indirectly, another consideration weighs into any discussion of an operating system upgrade. Eventually, CSP software will be converted to a High Order Language. This conversion, like the conversion of operating systems, will require extensive software rewriting. Because the prospect of two massive software conversion efforts outweighs the apparent advantages to be gained by implementing the RSX-11M+ operating system, the Informatics analysis concluded that a decision on upgrading the operating system be deferred until a decision is reached concerning the High Order Language question.

After a thorough review of the Technical Report and Informatics recommendations, RADC and AFIS decided not to proceed with an operating system upgrade to the RSX-11M+ version at this time.

3.1.2 CSP Hardware Configuration (SOW 4.1.1.1)

3.1.2.1 Objective

The objective of this task was to determine whether CSP could be modified to permit migration to a smaller, less expensive hardware configuration such as the PDP 11/24 or similar.

3.1.2.2 Accomplishments

Analysis under this task was supported by operational tests conducted during January, 1983, on a PDP 11/24 to determine the effects of error trapping on processors without odd address detection. The results of the tests and analysis were published in Technical Report 83-43110-05, "Communications Support Processor Operating System Upgrade and Hardware Configuration Interim Technical Report", dated April 1983. The Technical Report compared various smaller DEC processors against a PDP 11/70 standard in an attempt to identify the best candidate for migration of CSP software. The major considerations addressed are the following:

3.1.2.2.1 Instruction Set Compatibility

The criteria for comparison of compatibility with baseline CSP on a standard hardware configuration (PDP 11/70) was the degree by which the assembly language of the specified processors differed. It was determined that the PDP 11/23 and PDP 11/24 differed in 36 percent of the cases tested. For the PDP 11/34, this difference was noted in 35 percent of the cases. For the PDP 11/44, a difference of 20 percent was noted, meaning that the 11/44 was compatible with 80 percent of the assembly language cases tested.

3.1.2.2.2 Performance and Price Comparison

All processors considered were significantly less costly than the 11/70, with the difference most notable for the 11/24. The 11/34 and 11/44 have essentially equivalent price tags at the mid-price range.

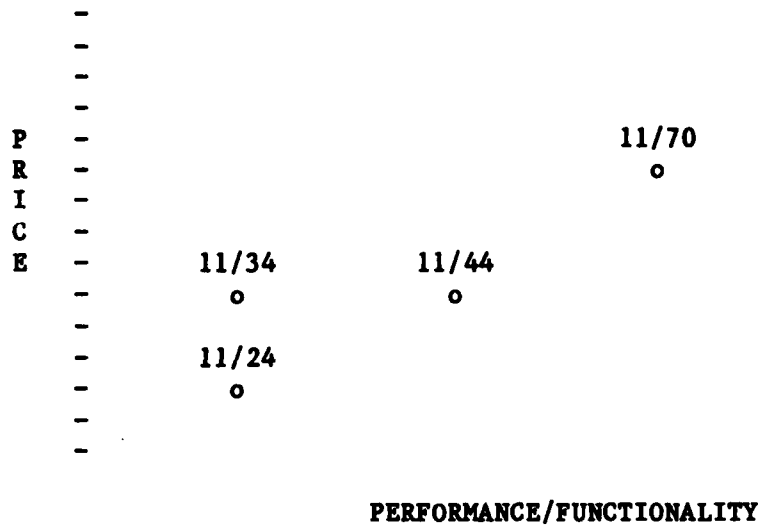
Although a smaller system, the 11/24 has the ability to access up to 1 Mb of main memory (248 Kb standard), provides improved multi-user performance, easy console operation and optional Floating Point capabilities for improved FORTRAN and BASIC operation.

The PDP 11/34 has several features of interest. One is the self-test diagnostic routines which continually check for system faults. Another is the automatic bootstrap loader, permitting system restart from various peripheral devices. An easy-access backplane facilitates system configuration. The floating point option available

with this system can improve the speed of floating point operations by a factor of ten. Available also is a cache memory capability which can increase system performance by up to 60 percent.

Features which distinguish the fourth generation, mid-size PDP 11/44 include the 8 Kb, high speed cache memory for fast execution and improved system throughput. Memory management in the 11/44 is another feature which improves overall performance as well as providing increased protection in a multi-user environment. Inherent in the 11/44 is the ability to access 1 Mb of main memory and error detection/correction coding to assure high reliability of memory. The Floating Point option for improved performance in FORTRAN and BASIC applications is also a feature of the PDP 11/44; and an option is available for a battery backup system, protecting data integrity during power failures.

The chart below summarizes the price/performance comparison of the three processors examined against the PDP 11/70.



See the referenced Technical Report for a more complete discussion of other aspects of the comparison such as operating system support, peripheral support, physical characteristics and power requirements.

3.1.2.3 Discussion

The analysis that Informatics conducted on small processors to which CSP might be migrated concluded with a recommendation that the PDP 11/44 be selected. This recommendation was based upon the degree to which the 11/44 could match the 11/70 in performance, the significantly lower software cost in converting to the 11/44, the acceptable cost of the hardware itself, an available memory capacity of 4 Mb and the ability of the 11/44 to support the new Digital Storage Architecture.

The Technical Report and the contractor recommendations were the subject of considerable interest at the August CSP User's Conference sponsored by AFIS in Bellevue, Nebraska, with the group consensus favoring adoption of the recommendation concerning the PDP 11/44 as the small system alternative to the PDP 11/70.

3.1.3 Message Distribution Clerk (SOW 4.1.1.2)

3.1.3.1 Objective

The objective of this task was to determine the feasibility of optionally supporting Message Distribution Clerk (MDC) functions via a single screen CRT device conforming to DODIIS criteria for a standard alphanumeric terminal.

3.1.3.2 Accomplishments

Analysis of single screen terminals concentrated on one example of a "dumb" terminal, the DEC VT100, and one example of an intelligent terminal, the Delta Data 7260T; although the analysis would generally apply to other, similar terminals. Both terminals were compared as to cost and performance with the standard OJ-389, dual screen terminal.

3.1.3.2.1 "Dumb" Terminal Alternative

The approach taken under this alternative was the replacement of the current OJ-389 subsystem with a software module within the host processor which would provide an equivalent functionality at a DEC VT100 (or similar) terminal. Such a terminal could be interfaced to CSP by any hardware device supported by the DEC Terminal Handler (e.g., a DL or a DV). The new software module, Terminal Control Program, would support each of the functions currently performed by the OJ-389 subsystem. The light pen function of the OJ-389 would be provided through direct cursor addressing, so any terminal considered under this alternative would require this capability.

Two other significant differences between the single-screen "dumb" terminal and the OJ-389 involve the dual screen handling and a scrolling feature. The dual screens of the OJ-389 would be retained in separate disk files under control of the Terminal Control Program. A key on the numeric keypad would be used to flip between the two screens, with the currently displayed screen being returned to its disk file (including any modifications made to the contents while being displayed). The other feature, scrolling, replaces the "next page" function and "previous page" functions of the OJ-389. Both a "scroll down" and a "scroll up" option would be available at the terminal, giving the user the ability to move forward or backward through a message one line at a time.

Message editing, dissemination, manipulation, generation and recall features would all be available at the terminal with user actions not differing significantly from those on the OJ.

Section 3.3.3 discusses cost comparisons and other benefits of the "dumb" terminal alternative.

3.1.3.2.2 Intelligent Terminal Alternative

An intelligent terminal alternative would function more like the OJ-389 than would the "dumb" terminal. The software modules which presently provide the interface to the OJ would also be used, with modification, to interface with a single-screen intelligent terminal such as the Delta Data 7260T or 8252T. The dual screen capability of the OJ-389, however, would be provided through use of the "split screen" feature of the Delta Data. In conjunction with the programmable key capabilities, the split screen will enable the user to obtain an equivalent functionality to that of the dual screen.

Because an intelligent terminal is microprocessor based, with its own resident memory (18,000 characters in the case of the Delta Data 7260T), message manipulation is handled without intervening reference to the host processor. As with the "dumb" terminal option, a scrolling function would replace the "next page" and "previous page" options of the OJ-389. Programmable Function (PF) keys would be used to interface with the host terminal software for such features as selecting the next message on queue or the highest priority message on the queue.

Message editing, dissemination, manipulation and generation would not differ greatly, procedurally, from the familiar functions available with the OJ-389. The user would, of course, have to familiarize himself with the keyboard layout and the logical functions assigned to the PF keys. One useful feature in message generation is the availability of the "canned" message option. This option calls up a prepared message format by a single depression of one of the PF keys. The operator or analyst may then insert necessary data, or otherwise modify the prepared text, and introduce the finished product into the system with a single depression of the "Send New MSG" key, another of the programmable function keys. This feature can greatly reduce the time-consuming process of creating new messages for frequently recurring requirements.

An intelligent terminal, such as the Delta Data, offers other potential advantages beyond the enhanced operations related specifically to CSP. The terminal may be expanded through the addition of floppy disk drives to provide increased memory. Other peripherals, such as printers, may then be added to permit stand-alone operations, if desired. And because a terminal like the Delta Data uses the CP/M operating system, hundreds of application programs are readily available, off the shelf, to meet specialized needs.

3.1.3.3 Discussion

The technical report analysis cites benefits of alternatives to the OJ-389 for use with CSP. Advantages in obtaining vendor supplied software, in the reduced size of the terminal, in the support provided for additional peripherals and in the functions available within the terminal-resident software were highlighted (primarily for the intelligent terminal). Perhaps the most dramatic difference, and a major advantage for the alternative terminals, however, is the cost. Purchasers of a VT100, for example, will obtain an 87 percent cost reduction compared with the OJ-389. Even for the much more capable Delta Data 7260T, the cost reduction still amounts to 82 percent.

For these reasons, and because the Delta Data had been accepted as a standard DODIIS terminal at the time the Technical Report was prepared, the final recommendation concluded that the Delta Data 7260T offered the optimal solution for desired replacements of the OJ-389.

At a subsequent meeting during August, 1983, representatives of AFIS, Informatics and INCO discussed standardization of CSP and MAXI efforts in Delta Data development. With new information concerning the Delta Data 8252T terminal, a more versatile version in this series, it was decided that both CSP and MAXI would standardize on the 8252T. Development activities on the Delta Data 7260T were consequently suspended. The conclusions and recommendations of the Technical Report, however, would remain essentially the same if the 8252T were substituted for the 7260T as the intelligent terminal of choice. The 8252T, in fact, compares even more favorably, since the terminal is directly plug-compatible with the OJ-389, and can be substituted with a minimum of technical support.

3.1.4 Multiplexer Interface (SOW 4.1.1.3)

3.1.4.1 Objective

The objective of this task was to determine whether the capability could be obtained or developed to provide an optional interface to all communications and peripheral devices currently supported by baseline CSP, independently of the BR1569 or BR1731 multiplexer.

3.1.4.2 Accomplishments

Informatics conducted a thorough analysis of nine possible alternatives to the BR-1569/1731 multiplexers used as the communications interface to CSP. The results of this analysis were published in Technical Report 83-43110-03, "Communications Support Processor Multiplexer Interface Technical Report" dated March, 1983.

The purpose behind the objective stated for this task was to attempt to locate a less complex and less costly solution to the communications interface requirement for CSP. The old standard, the BR 1569, and the updated replacement, the BR 1731, were designed to handle a variety of protocols; making the device unnecessarily complex for most CSP applications, and rather expensive (typically in the range of \$25,000 for a basic 16-line configuration, and nearly twice that for the 32-line version). Further, the BR 1569/1731 devices are not DEC-supported; therefore, require third party maintenance support. Lack of DEC support also means that considerable device handler upgrade support is necessary to permit use of the Bunker Ramo devices in the CSP operating environment.

These factors led to a decision to concentrate upon an analysis of less costly multiplexers that could meet any or all of the potential CSP applications and would not require extensive device handler support or third party maintenance. The following devices were selected for analysis:

- o DL11. The DL11 is an asynchronous, single line interface which can permit a PDP-11 to communicate with a local terminal, a remote terminal via modems over a private line or the public switched telephone network, or with another PDP-11 computer.
- o DZ11. The DZ11 is a program-controlled, asynchronous multiplexer which connects a PDP-11 or VAX 11/780 to 8 or 16 asynchronous serial lines.

- o COMM IOP-DZ. The COMM IOP-DZ is an intelligent, asynchronous Direct Memory Access line controller with an auxiliary processor which relieves the CPU of the time-consuming process of dealing with asynchronous lines and terminals.
- o DH11. The DH11 is an asynchronous, serial multiplexer which permits operations with up to 16 individually programmed serial communications lines.
- o DV11. The DV11 is a programmable communications preprocessor which permits interface of the PDP-11 with either eight or sixteen synchronous and/or asynchronous communications lines. Character size and format of the sync lines are switch selectable for each 4-line group. Character size and format, and speed of the async lines are program selectable for each line.
- o DQ11. The DQ11 is a high-speed (up to 1 Mbit/Sec in the DQ11-EA model), double-buffered, serial synchronous PDP-11 interface which permits the PDP-11 to be used for remote batch and remote concentrator applications. In cases where it is desired to use the PDP-11 as a communication front-end, the DQ11 permits the handling of local and remote synchronous terminals.
- o DUP11. The DUP11 is a program-controlled, double-buffered device designed to interface the PDP-11 processor with a single, serial synchronous communications line. The notable characteristic of this device is its ability to handle a wide variety of bit or byte oriented protocols.
- o COMM IOP-DUP. COMM IOP-DUP is an intelligent, synchronous line controller based on a KMC11-A auxiliary processor, used to control a DUP11 synchronous interface over the PDP-11 UNIBUS. COMM IOP-DUP is designed to implement high-performance communications network systems. It can provide a small but extremely powerful front-end and is ideal for message switching applications, where high efficiency can be achieved at substantial cost savings over the more conventional methods.
- o DMR11. The DMR11 Network Link is designed for high-performance connection of PDP-11 and VAX computers in network applications within a single facility. The device can be configured for operation at speeds up to 1 MBS over inexpensive coax cable.

3.1.4.3 Discussion

The analysis conducted by Informatics found several alternatives to the BR-1569/1731 multiplexer which fit the criteria of the original objective. All of the alternatives examined were less costly than the BR-1731, the only currently produced version of the Bunker Ramo device used for CSP applications. However, no single device was found which would fit the variety of communications line configurations and applications that CSP must serve. Consequently, some analysis, selection and tailoring is required to insure the optimal interface device or combination of devices is specified for the desired use. The following summary, extracted from the March, 1983, Technical Report, identifies those DEC-supported devices which meet CSP interface requirements in most configurations:

The DZ11 and DUP11 are modern devices which could function adequately on small systems with a light traffic load. Since neither of these devices perform DMA transfers, the system overhead may be unreasonable on a CSP system with a moderate to heavy traffic load. Under these operating conditions, the COMM IOP-DZ and COMM IOP-DUP would be ideal controllers for the CSP. These devices are DMA controllers that consists of a microprogrammed KMC11 and single or multiple DZ11s or DUP11s respectfully.

The DV11 however, has several characteristics that recommend it as an excellent alternate interface for the current CSP. The DV11 will function with the range of PDP-11 computers from the PDP-11/24 through the PDP-11/70, and will function satisfactorily on small, medium and large CSP configurations. It is the only DEC multiplexer that supports both synchronous and asynchronous lines. This extreme flexibility of the DV11 is supported by the fact that as a single device it will support all CSP communications with a single handler. Any consideration for simplicity would be in favor of the DV11. In addition, it is an intelligent DMA device that will unload much of the communications work from the main computer.

3.1.5 History and Intercept Capability (SOW 4.1.1.4)

3.1.5.1 Objective

The objective of the History and Intercept Capability task was to analyze the feasibility of optionally providing a second disk capability for CSP, and to design such a secondary message file support capability. Availability of a second message file would permit additional options in history and intercept capability other than the standard message file disk with history tape configuration. Achievement of such an objective would permit several enhancements in CSP operational efficiency.

3.1.5.2 Accomplishments

Analysis and design of a second disk history and intercept capability were completed and the results published in Technical Report 83-43110-04, dated March, 1983.

3.1.5.2.1 Current History and Intercept Procedures

CSP requires dual recording of all message traffic. The on-line message storage requirement for a typical CSP site is 30 days, with the ability to meet these storage requirements being dependent upon the volume of traffic at the site and the capability of the disk used. History tapes are generally used both as a backup to the disk and to retain messages in longer term archival storage. The history tape also is used for intercept purposes--the rerouting of traffic for selected queues to the history tape queue for later re-entry to CSP for processing. This intercept capability is useful, for example, when one or more tributary stations are temporarily out of service, or when the CSP host system itself must be drained of traffic, as when the system must be shut down for maintenance. Upon system restart, active system traffic is recovered from the tape by message or groups of messages and processing proceeds normally.

3.1.5.2.2 Disadvantages of History Tape

The disadvantages of using tape medium for message storage or intercept purposes are generally described in terms of I/O speed. The slow speed of the tape medium compared with disk presents problems, mostly time related, both when writing to the tape and when it is necessary to recover information from the tape.

In the dual recording process, redundant I/O write requests are issued, first to the tape and then to the disk. Because of the relative slowness of the tape, however, the write request to disk is completed well ahead of the same action on tape. Therefore, the length of time required for any I/O action is the time required for the tape I/O.

A more dramatic time delay occurs when it is necessary to recover information from the tape, as is the case when a read failure is encountered on the disk. Because the desired message must be located from its place in a sequential file of messages, recovery can be quite a time-consuming process.

3.1.5.2.3 Alternatives to the History Tape

Until recently, searching for a viable, practical alternative to the use of tape for backup, history and intercept purposes was not feasible. No practical alternative could match the tape medium in its three premier attributes--large capacity, very high reliability, and low cost.

Recently, however, large strides have been made in disk technology, particularly in the three areas mentioned above: capacity, reliability, and price. With recent hardware improvements, large data volumes can now be stored on small, relatively inexpensive disks. Concurrently, significant improvement have been made in the techniques used by CSP for recording. Standard IAS operating system File Control Services (FCS) routines have replaced the non-standard methods formerly used by CSP for disk I/O, FCS employs rigorous tools to ensure proper disk space allocation, accurate I/O, and efficient handling of I/O errors. The increased reliability these procedures provide, along with cost reduction in high capacity disks, has effectively eliminated the comparative advantage of tape for large data storage applications. As an example, Digital Equipment Corporation has announced a 205 megabyte cartridge disk to be used in a drive roughly equivalent in cost to the TE16 magnetic tape drive; one disk cartridge for this system, costing \$600, would replace approximately \$800 worth of magnetic tape. Larger capacity disk systems are available, such as the DEC RA81, a fixed-media winchester drive with a 456 megabyte capacity. Developments such as these have permitted consideration of other configurations as alternatives to the standard disk with tape backup found in the typical, existing installations.

3.1.5.3 Discussion

The referenced Technical Report concluded that the state of the art in disk technology has advanced sufficiently to permit configuration other than the standard message file disk and tape backup/history arrangement. Some arrangements which may now be considered include the following:

- o Disk/Disk. This option permits completely tapeless operation, with the message file disk being augmented with a second disk capability for both backup and history/intercept purposes. All the advantages provided by the increased I/O speed of disk operations would be available to organizations with small to medium message volumes, with anticipated reliability comparable to that of present disk/tape systems. Costs would not differ significantly from the typical arrangement, and might well be less.
- o Disk/Disk/Tape. Those organizations with a requirement for longer term archival storage, and those with larger traffic volumes, might well chose to use a second disk as a backup, mirror image of the message file disk, while retaining the tape capability for history purposes only. Intercept might well be to an operator-specified medium, either tape or disk.

To further improve system reliability, the two disk systems could be installed each with its own controller.

In conclusion, CSP users now have disk alternatives available that provide capacity, reliability and low cost that compare favorably with tape media, while retaining the advantages of reduced system overhead and high I/O speeds.

3.1.6 Ancillary Control Processor (SOW 4.1.1.5)

3.1.6.1 Objective

Analyze the capability to utilize the DEC Ancillary Control Processor (ACP) concept to improve processing efficiency and reduce memory requirements for the CSP baseline system.

3.1.6.2 Accomplishments

The analysis of this capability was performed by examining several publications by DEC and the Digital Equipment Computer Users Society (DECUS). These publications were written by users who had previously implemented ACPs under the RSX-11M operating system. This provided considerable information on the applicability of ACPs to the CSP system. It was determined that although CSP could benefit from the ACP technology, it could not be implemented separately as it is tied to several other tasks.

3.1.6.3 Discussion

The original intention of this task was to benefit from the ACP functionality associated with the operating system RSX-11M. Although ACPs are allowed under IAS, not as much benefit would be derived from implementation under IAS as would be the case with RSX. The decision not to convert CSP to run under RSX-11M or RSX-11M+, also affected the decision on whether to implement the ACP capabilities. ACPs still may be used at some point in the future as new capabilities are added to CSP, but it makes little sense at this time to rewrite CSP just to take advantage of the ACP technology.

3.1.7 Message Recall (SOW 4.1.1.6)

3.1.7.1 Objective

The objective of this task was to determine the feasibility of developing an automatic message recall feature for location and retransmission to designated/controlled lines of traffic identified in formatted service messages.

3.1.7.2 Accomplishments

This analysis was successfully completed and a proposed design for future implementation was included in Technical Report 83-43110-10, "Communications Support Processor Message Recall Interim Report", issued in August, 1983.

3.1.7.2.1 Current Procedures

Every Telecommunications Center (TCC) receives a variety of retransmission requests, both verbally and via service messages. However, when a request is received by the TCC Supervisor, a search is initiated for the requested message, using references such as Time of Transmission (TOT), Date/Time Group (DTG) or Channel Designator Sequence Number (CDSN). If an initial search fails to locate the desired message, the operator may broaden the search by specifying a wider TOT range, or may formulate a recall command based on a CSP Message Ledger Number (MLN) range which he believes may contain the message sought. If the message is located, the operator adds a pilot to the message and routes it to the proper output queue. In the event that a search fails to locate the requested message, the Supervisor prepares a service message to the requestor advising him that the referenced message could not be located and that tracer action may be initiated.

3.1.7.2.2 Proposed Recall and Retransmission Procedures

The Informatics analysis concluded that software could be developed which would implement an automatic recall feature within CSP. The following steps, extracted from the referenced Technical Report, summarize the design which was proposed to accomplish the automatic recall feature within the CSP if AFIS and RADC were to direct implementation.

- o Strict validation of retransmission request service message format.
- o Testing for auto-recall for receive lines.

- o Building a PRB for SVCCON.
- o SVCCON processing.
- o Scanning for possible recall parameters.
- o Building and issuing a recall command line.
- o Validating the new recall command line parameter.
- o Preparing a PRB for RCLCON.

3.1.7.2.2.1 Multiple Recall Requests in Progress

The recall software will be modified to allow multiple recall requests to be processed under a terminal identifier of TT0: or the CSP console device. Currently, a limit is specified in TRMCOM allowing only one recall request to be initiated from the console. By eliminating this limitation in TRMCOM and the checks in RCLCON, multiple recall requests can be entered manually from the CSP console and automatically from SVCCON.

3.1.7.2.2.2 Actions Taken Upon Recall Failure

Each recall command line, generated automatically by SVCCON, will be printed on the CSP console along with a suitable indication that the command line was produced internally. The recall software will then search the CSP message file for the requested message. Upon completion of the search, RCLCON will indicate the number of messages recalled. If no messages were found the operator or shift supervisor will have to intervene in the recall/retransmission process. The service message that initiated the recall search will be on the SVC queue. It will be the TCC's responsibility to use the service message to initiate alternative recall commands from other references to the requested messages and perform any other necessary follow up procedures in handling the request for retransmission.

3.1.7.2.2.3 Release Authority for Selected Output Queues

In order to monitor the auto-recall data flow and ensure that the recall requests are handled correctly, selective local (non-AUTODIN and non-NSA) output queues may be configured with a "no auto-recall allowed" bit set. This means that once a requested message has been recalled and re-addressed, RCLCON will identify the intended output queue and will test the queue configuration to see if the "no auto-recall allowed" bit is set. If the bit is set, the message will be marked in the PAD as release authority required. Then, once the message is reintroduced, it will eventually be placed on the SVC queue

to be manually released to the proper output queue for retransmission. If the bit is not set, the re-introduced message will be handled normally by the CSP system and will not come up for release authority.

3.1.7.2.2.4 Ensuring AUTODIN Release Authority

After the recalled message has been re-addressed with the new routing indicator, RCLCON will search the CSP routing indicator common area for a match with the message's TO RI. If no match is found, an AUTODIN or NSA destination is assumed. RCLCON will set the release authority bit in the PAD of the message so that when the reintroduced message is processed by the Format Check software it will be queued for release authority before being transmitted to its non-local destination. This RCLCON logic will be performed whenever a routing indicator is specified as the last parameter in the recall command line parsed by RCLMCR, since this parameter will primarily be used by the auto-recall software.

3.1.7.3 Discussion

The analysis concluded that an automated message recall feature could be added to CSP, requiring a fairly simple and straightforward modification of a few software modules. Potential benefits to be derived would include a decrease in operator workload at the TCC and increased speed of delivery for recalled messages.

The analysis and conclusions were presented to the CSP User's Conference during August, 1983, but the consensus of the group was that implementation of this feature should be deferred for the present. It was felt that this capability would impose a processing burden on CSP and derive very little benefit. Most Mode II tributaries would continue to use the telephone to communicate recall requests and therefore this capability would not be used much. This capability however should be tabled until TCATA has had an opportunity to comment on it, since they were not represented at the users conference.

3.1.8 Direct AUTODIN Interface (SOW 4.1.3)

3.1.8.1 Objective

Analyze the capability to interface directly to the AUTODIN Switching Center independently of special AUTODIN interface devices, such as TLC, AID, or INTEQ.

3.1.8.2 Accomplishments

The analysis of this capability was begun by examining DCA Circular 370-D175-1, DCS AUTODIN Interface and Control Criteria. This publication describes the operational characteristics to be used between switching centers and between centers and their tributaries. Also considered was the design of the AUTODIN interface module being used in the Realtime AUTODIN Interface and Distribution System (RAIDS). Because several areas of CSP design were patterned after RAIDS and because the RAIDS AUTODIN interface has many structural similarities to a CSP gateway, it was determined that using this software would reduce the design effort considerably.

This capability was first brought to the users attention at the CSP Users Conference in February, 1983 and again at the August, 1983 Conference. In both instances the consensus among the users was to suspend this effort and not to implement this capability.

3.1.8.3 Discussion

There were several objections raised by both current and potential CSP users regarding the implementation of this capability. They include hardware, operational, and security reasons.

Most of the current users felt that eliminating the TLC-100 or Inteq AUTODIN interface device would not benefit them to a great extent since they already have the units and most likely would not eliminate them if the capability were developed within CSP. Although some problems were noted with the hardware, it was not viewed as being excessive.

Operationally, it was felt that eliminating the interface device would remove some of the indicators and status information which is currently supplied by these devices. For example, the indicator lights on the device currently show several conditions: synchronization, no reply from AUTODIN, Wait Before Transmitting, character frame, end-of-text transmitted and received, and message cancelled. This information would have to be supplied by other means to effectively monitor the AUTODIN circuits.

Another major operational consideration raised was the use of the alternate mode on the AUTODIN interface device. This capability allows the user to continue operating even when the processor is down by connecting a Mod 40 teletype to the device and initiating the alternate mode logon sequence. This capability would be eliminated entirely if a software solution was implemented.

The security accreditation and DCA certification of the CSP is based on the existence of an AUTODIN interface device which in itself is certified. Any variation of this would cause a full reaccreditation and recertification of CSP as an AUTODIN tributary. This would require a full Category I and Category III certification by DCA. Whereas the Cat III certification is routinely performed on CSP, the Cat I test is a very difficult thing to satisfy. DCA examines all new interfaces based on very rigid criteria which were not in effect at the time of the original Cat I certification of the TLC.

For these reasons, it was decided that this capability should be placed on hold and not to expend the resources to complete this task.

3.1.9 CSP Site Support (SOW 4.1.4)

Task activities under CSP Site Support are comprised of six categories of user assistance: pre-installation support; installation configuration; installation, test and checkout; user familiarization and training; enhancements/updates distribution; and installation configuration management. All supported sites saw activity in one or more of these categories during the year of this report.

3.1.9.1 Pre-Installation Support/Site Surveys

Before a CSP software installation is begun, Informatics reviews the detailed hardware configuration, the operational requirement, and the program milestones. This is accomplished through a site survey, including discussions of operational concepts and requirements with site users representing functions such as requirements, operations and communications. New site managers are provided pre-installation procedures to ensure timely and successful installation of selected software modules. During the report period, site surveys were conducted at FSTC, DIA, NAVINTCOM, NPIC and NOSC.

3.1.9.2 Installation Configuration

Once the site surveys were accomplished and the necessary information gathered, the CSP configuration to be installed was tailored at the central support facility to meet the requirements of the specific site. During the year, configuration of software modules included those for FTD, LANTCOM, PDSC, USAFE, REDCOM, USAREUR, TFC, MAC, and SAC. For two of these sites, USAREUR and MAC, the central support facility first configured CSP Release 2.2 C2, and later Release 2.3 to meet project installations.

3.1.9.3 Installation, Test and Checkout

The process of completing a transfer of the configured CSP software system into an initial operational status at the user site involves a multi-faceted effort consisting of the software installation itself, system generation, system checkout, and test support. From the contractor support side, installation is a two-person effort. One of the individuals concentrates on building the system and configuring all the site unique parameters, while the second assists the user in preparing the user-maintained tables such as routing, dissemination, user IDs and security tables. Since maintenance of these functions is a user responsibility, it is important that the user be thoroughly capable of performing the necessary actions. Training of user personnel proceeds immediately upon completion of the installation, one

person devoting his time to this task while the other performs a thorough system test in accordance with the CSP Installation, Test and Site Acceptance Plan.

For installations of new Releases or updates into an existing CSP site, many of the same procedures are followed; however, since the user is already familiar with CSP operational procedures, the full formal test and acceptance procedures are unnecessary. During the period of this report, installations were completed at USAREUR, MAC, FTD, ADCOM, PDSC, USAFE, REDCOM, SAC, and LANTCOM.

3.1.9.4 User Familiarization and Training

As indicated above, user personnel must be prepared to accept responsibility for certain CSP maintenance functions once installation has been completed. For a new installation, even experienced operators completely familiar with communications procedures, will not be immediately conversant with the conventions associated with CSP operations. For these reasons, a new installation is accompanied by a thorough familiarization with the maintenance of routing, dissemination, User ID, and Security Tables as well as hands-on training with the equipment. The familiarization process is generally less extensive when the installation consists merely of an update of the site software or replacement with a new Release. However, central support personnel conduct training to the degree required to verify that the user will encounter no significant problems in proceeding with the new operational configuration. This training was conducted in conjunction with installations/updates at USAREUR, MAC, FTD, SAC, ADCOM, PDSC, USAFE, REDCOM, and LANTCOM.

3.1.9.5 Enhancements/Updates Distribution

As enhancements are developed they are distributed from the Central Support Facility to the user sites. The distribution includes the update tape along with all necessary support documentation. In case of a more substantial update, requiring implementation procedures beyond local site capability, both delivery and installation are accomplished by central contractor personnel. During the report period, CSP update tape V23A was sent to those sites with Release version 2.3 installed; and a distribution of update V23B was in progress at the close of the report period.

3.1.9.6 Installation Configuration Management

As software installations are completed at the individual sites, all installation information was turned over to the configuration management group for use in completing the site hardware and software inventory. The responsibilities of the Configuration

Manager and a discussion of the Configuration Management Program are contained in section 3.1.15 below. Installation Configuration updates were completed during the report year at ADCOM, REDCOM, FTD, LANTCOM, PDSC, USAREUR, USAFE, TFC, MAC, and SAC.

3.1.10 Training (SOW 4.1.5)

3.1.10.1 Objective

Training for users, in addition to the familiarization training associated with installation of an update or enhancement, may be conducted as necessary either at the Central Support Facility or at the user location. This training generally consists of somewhat more formal instruction, usually tailored to the needs of a particular user. This training therefore encompasses the full spectrum from full classroom training of programmers to hands-on training of operators at either an operational site or the Central Support Facility.

3.1.10.2 Accomplishments

Training at varying levels was provided for FTD, USAREUR, ADCOM, PDSC, LANTCOM, USAFE, REDCOM, TFC, SAC, and MAC. This training primarily covered the new capabilities associated with installation of Release 2.3. FARM and PLA training was provided to key maintenance personnel to allow them to create and maintain the respective data bases.

New training materials have been prepared and published. They consisted of a slide presentation that explains the basic philosophy and operation of CSP, and a set of exercise scenarios to provide hands-on training in handling various normal and unexpected situations. These scenarios were provided in the form of a student guide and an associated training official guide. Also included is an operator reference guide which can be placed at the operators console position for ready reference.

3.1.10.3 Discussion

Training is considered an ongoing effort and cannot be defined in terms of a start and a completion of activities. As a CSP system is installed for the first time at a given location, full CSP training is provided to the communications operators, computer operators, systems management personnel and maintenance programmers. Thereafter, as personnel rotate it is the responsibility of the site to train their new operators. The training materials provided under this work effort are designed to be an aid to the site in preparing their own training program. It can be tailored as desired to incorporate the site-unique features and local operating procedures required by each site.

As new releases are installed and updates are sent to each site, the appropriate training will be provided on the new or changed capabilities. Updates to the training materials will be made as necessary to reflect these changes.

3.1.11 CSP Software Inventory (SOW 4.1.6)

3.1.11.1 Objective

A software inventory shall be maintained of all CSP software modules which can be configured into a CSP based system. This inventory shall include the support history of each module and shall be the baseline to which all future system additions or modifications will be applied. A site-unique software inventory shall be maintained for each site which will identify that subset of CSP baseline software configured for a given installation, as well as the tailored modules that were developed to satisfy the site-unique automation requirements.

3.1.11.2 Accomplishments

During the report period CSP Release 2.3 was completed and installed at several sites, replacing Version 2.2C2, and Update Tape V23A was provided to all sites with Version 2.3. The CSP software inventory was consequently revised to reflect these changes to the system baseline and the site baselines, as appropriate. A similar revision will occur to the site software inventories as Update Tape V23B is delivered and installed.

3.1.11.3 Discussion

As is evident from the number of updates, enhancements, and entirely new features described elsewhere in this report, CSP is a dynamic program, continually being revised to accommodate community requirements as identified by AFIS. The periodic revisions to meet the requirements of the user community necessitate reestablishment of the CSP baseline on a fairly regular basis. In addition to the common baseline configuration, individual sites have peculiar requirements which must be tailored to meet their unique needs. When added to the CSP baseline, the site unique software results in a baseline which differs somewhat from that of any other site.

Key to effective management of the CSP Program is a method of controlling the software modules which comprise both the baseline CSP system and those of the individual sites. To insure the required degree of management control, a software inventory is maintained of all software modules which can be configured into a CSP based system. This inventory includes the support history of each module. An additional inventory is maintained of the site-unique software for each site.

3.1.12 AFIS Support (SOW 4.1.7)

3.1.12.1 Objective

As part of the overall CSP management program, Informatics assists AFIS by maintaining a central repository for system enhancements. This process includes assistance in the evaluation of site-specific requirements and the development of the applications to meet the user need. After the enhancement has been completed and reviewed by AFIS for the Air Force, it is made part of the baseline, and the software is made available to other sites.

3.1.12.2 Accomplishments

Because AFIS/IND has not had its own computer installation nor the facilities to maintain the CSP baseline and distribute software to the user sites, the CSP baseline has been maintained by Informatics, under contract, at their Bellevue, Nebraska software development facility. As changes have been made to the baseline, revisions to the software modules were incorporated into an update tape for distribution to the user sites. This process originally required that the site system be reassembled and re-taskbuilt after each change, since revisions were distributed in source form only. Once the system had developed sufficiently to permit installation in object form, however, most changes were also distributed as object, rather than source, code. Source code continues to be provided but only as necessary for specific modules, such as those which reconfigure system tables and site-unique parameters.

3.1.12.3 Discussion

In addition to assisting AFIS in maintaining the central repository and processing system enhancements, Informatics provides additional assistance by processing the system problem reports (CPRs) generated as a result of field experience. When the CPR cannot be resolved directly from the experience base of the central support programmers, the field problem is researched thoroughly, attempting to recreate the site situation when possible, and a reply provided to the affected site. Problem Reports are discussed more fully under section 3.1.17, Software Maintenance Support.

3.1.13 Software Engineering (SOW 4.1.8)

3.1.13.1 Objective

Computer software delivered in the course of this contract shall be implemented in accordance with RADC Software Development Specification CP 0787796100E, dated 30 May 1979.

3.1.13.2 Accomplishments

Several key modules within CSP have been written in a Program Design Language (PDL) to ease the future migration to a high order language. This PDL forces the software to be in a very structured format and therefore the transition to any high order language will become a much easier task.

3.1.13.3 Discussion

Since all coding for CSP in the first phase of the CSP Enhancements Contract has been in MACRO-11, the choice of a high order language does not enter into the software engineering constraints on CSP. This will, however, become more important as the CSP system progresses to a point where it will be rewritten in a high order language. This point will be addressed in the next phase of the contract in the High Order Language Analysis Technical Report.

3.1.14 Software Quality Assurance (SOW 4.1.9)

3.1.14.1 Objective

The Software Quality Assurance task was implemented to monitor and control the quality of the software being developed, assure that software delivered under this contract complied with the requirements of this contract, and to guarantee that the CSP software was developed, tested and maintained in an effective and efficient manner.

3.1.14.2 Accomplishments

Early in the contract period the Software Quality Assurance Program Plan was published. Procedures were established for work tasking and authorization, testing, corrective action, library controls, documentation preparation, software reviews, and software development techniques and methodologies. Throughout the contract period the enforcement of these standards has contributed immeasurably to the development of consistently high quality, and thoroughly tested CSP software.

As part of the Software Quality Assurance effort, Informatics has developed a procedure to help monitor the CSP development effort. A programmer first completes a check-out sheet and identifies the module name, the current version, the programmers account, the date and the reason for checking it out. The programmer makes the necessary changes to the module in his own account and performs testing and evaluation of the module. When this is completed, the programmer notifies the configuration manager who gives this check-out form to the project manager/quality assurance manager. This module then undergoes extensive retesting and validation and if ready, is baselined by the project manager. Since it is possible for a given module to be checked out by more than one person, this procedure helps to ensure that changes being made by two people to the same module will not adversely affect the final result. This entire procedure provides an effective audit trail for identifying changes to the baseline and aids the configuration management effort.

3.1.14.2.1 Plan Preparation

The Software Quality Assurance Plan was prepared according to the guidelines provided in MIL-STD-1521, Technical Review and Audits and DOD Standard 7935.1-S, DOD Automated Data Systems Documentation Standards. Particular attention was given to a practical

implementation of a plan that could be implemented in a manner that would assure that the software would be of the highest possible quality.

3.1.14.2.2 SQA Activities

Although the SQA philosophy is constantly present, it was particularly evident in the implementation of the new CSP Release 2.3 baseline. This involved major changes to the software to incorporate new features and enhancements. Thorough testing and certification was promoted by the SQA implementation guidelines (CSP Software Quality Assurance Program TR83-43110-02, March, 1983). Baseline testing and verification procedures followed the guidelines established in the CSP Installation, Test and Site Acceptance Plan, which describes in detail the site preparation, system generation, site operational tables, training and security accreditation. The Software Quality Assurance Program activities were a portion of every phase of CSP software development, testing, implementation, training, accreditation, and site acceptance.

3.1.15 Configuration Management (SOW 4.1.10)

3.1.15.1 Objectives

Configuration management is the application of systematic, technical and administrative procedures to identify and document the functional and physical characteristics of the CSP baseline modules as well as the site unique software for each CSP installation. Configuration management is used to ensure adherence to well defined procedures for implementing additions or modifications to the CSP standard system and provides a mechanism for recording and reporting system status and changes.

3.1.15.2 Accomplishments

Configuration management records were updated to reflect the installation of CSP release 2.3 at ADCOM, REDCOM, MAC, USAFE, USAREUR, PDSC, TCATA, TFC and SAC.

CDRL A009, Configuration Management Plan was completed and published in March 1983.

Configuration Control Board (CCB) meetings were conducted during the semi annual CSP Users Conferences in February and September 1983. These meetings reviewed all proposed suggestions/enhancements that had been submitted by all sites in the a form of a CPR.

3.1.15.2.1 Software Inventory

An accurate record of CSP software was maintained during this contract period with the aid of an automated Configuration Management System (CMS) developed at Informatics. With the use of this in-house tool, all CSP baseline software was identified and recorded.

3.1.15.2.2 Software Modifications Control

As CSP software updates were incorporated into the CSP, either as modifications to baseline or site-unique, they were logged into the CMS using a unique coding system. Using this coding system, it was possible not only to track the updated versions per baseline but to identify and record the site unique software modifications as well.

3.1.15.2.3 Software Modification Distribution

As new or updated CSP modules were released and distributed, the configuration management system played an essential part in maintaining records of the releases. Using a site subsystem in the automated system, a record of the most current CSP release per site, was maintained.

3.1.15.2.4 Site Configuration Support

The CMS supported each site configuration by maintaining a site inventory. This included for each site the current CSP release, the date of installation and any site unique software.

3.1.15.3 Discussion

Informatics has developed, as an in-house tool, an automated configuration management system to aid in the identification and maintenance of all CSP software. This tool has been a valuable asset by providing an accurate record of changes within the CSP for the past two years. It reflects the software inventory, software modifications, problem logging, CSP documentation and site inventory and has proved to be an instrumental aid in ensuring the integrity of the CSP.

3.1.16 Computer Programs (SOW 4.1.12)

3.1.16.1 Objective

All computer programs assembled or developed under this contract were delivered in the form of source and object code on magnetic tape, and accompanied by source listings. Assembly language was used. The goal of this task was to ensure that the most current version of all CSP software is delivered to AFIS/IND for distribution within the prescribed procedures.

3.1.16.2 Accomplishments

Since AFIS/IND did not have a computer facility or the capability of maintaining the baseline and distributing the CSP software to the user sites, this baseline has been maintained by Informatics at their Bellevue, Nebraska development facility. As modifications were made to any CSP software module, they were thoroughly tested before incorporation into the baseline. Distribution was made to the user sites via an update tape containing the changes into the user's system. This tape was given to AFIS to duplicate and send to each of the current CSP sites. The system is at the point where it can be distributed in object format for the majority of the modules. Thus CSP is now installed in object form and all modifications are also in object module form where appropriate. The only source code supplied to the site are those modules that are required to reconfigure the system tables and site unique parameters.

3.1.16.3 Discussion

As the computer facility is completed at AFIS/IND the CSP baseline software will be transferred to that facility and maintained there. This will consist of all sources and object modules. From there, object module distribution will be made as it is currently done at Bellevue. Any modifications made to the CSP will be thoroughly tested and the source code will be shipped to AFIS to update the baseline.

3.1.17 Software Maintenance (SOW 4.1.11)

3.1.17.1 Objective

Software maintenance included all work providing for centralized maintenance support to all CUBIC sites. This support took the form of CSP problem identification and resolution, as well as CSP enhancements. Problems were identified by the CSP on-site personnel and resolved by project personnel at the Bellevue development facility.

3.1.17.2 Accomplishments

Over the first phase of the CSP contract, several major accomplishments were made in correcting and enhancing the CSP system. As mentioned above, these accomplishments included problem resolution, as well as CSP enhancements. CSP corrections were made in three steps: problem identification, problem resolution, and problem response. Each separate process was activated when needed. Each area is discussed below. Enhancements included suggestions from AFIS/IND, as well as the CSP on-site personnel. General maintenance support was also performed at the Bellevue development facility.

3.1.17.2.1 Problem Identification

Problem identification was an important aspect of software modification. For the CUBIC CSP contract, problem identification took two forms: full-time, on-site support or centralized off-site support from the Bellevue development facility.

Generally, problem identification began with recognition of a CSP malfunction, attributable to software, by operators or user personnel at a CSP installation. AFIS/IND was informed of this malfunction by the issuance of a user report from the CSP site where the error occurred. After AFIS/IND had validated the problem report, Informatics was notified of the problem and began to diagnose it. Any site specific modifications which did not require AFIS/IND approval were corrected on-site and the changes communicated to the Bellevue office.

3.1.17.2.2 Problem Resolution

Once the Bellevue development facility received the problem report from AFIS, the process of problem resolution began. If necessary, phone conversations with the appropriate on-site personnel were conducted, in order to clarify the nature of the problem. This was followed by an extensive analysis of the software malfunction. Many times this analysis would indicate that an actual software error had not occurred; the malfunction could be traced to some other site occurrence.

If the problem was determined to be a software error, the required corrective action was determined and the resulting maintenance task was sized and scheduled. AFIS/IND was then given necessary information as to the diagnosis results and scheduled corrections. Under the terms of the contract, this notification occurred within five days of receipt of the problem report.

3.1.17.2.3 Problem Response

Once AFIS/IND had been informed of the status of the software error, Informatics kept them up to date via the monthly status report. All software malfunctions were identified as either 'open' or 'closed'.

Once the changes were made and successfully tested at the Bellevue facility, distribution was made to the appropriate installation. Depending on the time demands on the problem, distribution was made either immediately or at a convenient time, such as the shipping of a site release tape.

3.1.17.2.4 General Maintenance Support

Along with problem identification, resolution, and response, general maintenance support occurred at the Bellevue development facility. This support included implementation of new CSP releases; working with on-site user and operator personnel to investigate CSP malfunctions; and analyzing, planning, designing, coding, testing, installing, and documenting site unique software modifications. All these software modifications were designed, developed, tested, and implemented in accordance with CSP quality assurance and configuration management guidelines. This general maintenance support served as an enhancement to CSP functionality.

3.1.17.3 Discussion

For the most part, software maintenance functioned during the course of the CUBIC CSP contract as described above. Standard CUBIC Problem Reports (CPRs) provided a method for identifying all CSP errors on a numerical system, by site, as well as in sequential order. In addition to identifying CSP software errors in a more efficient fashion, the CPR system also provided for accurate record keeping of all suggestions/enhancements for the CSP. These suggestions and enhancements were reviewed by AFIS and Informatics and, if deemed appropriate, were acted upon.

Also a telephone trouble call procedure was implemented to assist in the identification and resolution of problems. As a telephone call is placed to the maintenance staff in Bellevue by site personnel, the details of the problem are recorded on a trouble call form. The caller

also identifies whether the problem is routine, immediate or urgent. This will determine the response time given the problem. All urgent calls with the CSP system down will be put through immediately. All others may be put through or the call may be returned.

3.2 On-Site Maintenance (SOW 4.2)

On-site maintenance of the baseline, enhancements, and site unique software was provided as a site option. This included analyzing, planning, designing, coding, testing, installing, and documenting site unique software. The option also included providing familiarization to selected operators and programmer/analysts; identifying, analyzing, reporting and/or resolving software problems or enhancements; and providing assistance to the operating agency on the integration, installation and implementation of new CSP hardware/software. Each site currently receiving on-site support is discussed below. Appendix A contains additional information on each site where CSP is installed.

3.2.1 TCATA, Ft. Hood, Texas

On-site support was initiated during the month of June, 1981 at TCATA. Some minor hardware problems were identified and resolved with the OJ-389 terminal and the BR1569 multiplexer. Several joint exercises were supported by CSP and the on-site personnel during this contract period. In March, 1983, the Remote Communications Processor (RCP) was deployed to Ft Bragg, North Carolina in support of Gallant Knight '83. Although Mode II circuit reliability problems were noted, CSP did not have any significant problems. Following the exercise, the RCP was reconfigured and given a temporary recertification to run message generation software for the VT100 terminals and a plotter. The RCP was deployed to Korea in this configuration to support a major exercise there. Upon return from Korea, the RCP was again reconfigured to remove the VT100 and plotter software and move them to a PDP 11/24 located in the RCP. This configuration was used to support the REDCOM exercise in Florida.

3.2.2 MAC, Scott AFB, Illinois

On-site support was initiated during the month of June, 1981 at MAC also. MAC is operating under a unique hardware configuration with both the CSP tasks and the message file on a single disk. This does not require any special software to support this arrangement; however, the on-site support representative is needed to keep the system operational under this configuration. Any time the system pack gets corrupted due to hardware failure, it is necessary to cold start the system since the message file is coresident. This arrangement has not appeared to hamper on-line operations except for the frequent degradation of the ability to recover messages on-line from the message file after a cold start. Several hardware problems and system crashes were encountered during this contract period. Significant problems were also noted with the IAS spooler task and line printer handler. CSP Release 2.3 was installed and does not use the spooler for printing message traffic. Therefore, many of the problems appear to have been eliminated. An attempt was made to migrate to the PDP 11/45s

at MAC to alleviate the problems associated with a single processor, single disk system. This attempt was unsuccessful, since the 11/45s are old and unreliable and only support 128K words of memory. The existing 11/70 was upgraded by another 64K memory and appears to be operating fine.

3.2.3 USAFE, Ramstein AFB, Germany

On-site support was begun at USAFE during the month of August, 1981. A second PDP 11/70, with new BR1731 multiplexers and disk drives, was installed during this contract period. The CSP was accredited to interface to a GENSER-only MAXI at the USAFE OSC in support of an exercise. This was accomplished using back-to-back TLCs since the signals had to be encrypted. A problem of NATO formatted messages being incompatible with CSP was surfaced during the exercise and was corrected. Another unique problem that was discovered relates to releasability of messages to non-US personnel. In particular, TOP SECRET messages should be allowed to be released to certain countries based on the routing indicator and SPECAT designator. The solution is currently being analyzed and a modification will be made to CSP to allow release of these messages.

3.2.4 LANTCOM, Norfolk, Virginia

On-site support was initiated during the month of September, 1981 at LANTCOM. They encountered a problem with the dual disk handler in performing a catchup function while the system software was on the same type disk. Use of this version of the dual disk handler was suspended. A solution was designed and baselined for the problem surfaced at LANTCOM regarding the handling of CRITIC messages. This solution bypasses format checking if a message is identified

3.2.5 ADCOM, Colorado Springs, Colorado

On-site support was begun at ADCOM during the month of January, 1982. The actual installation of the CSP, however, did not occur until mid August 1982, due to facility construction delays. A receive magnetic tape capability was configured to support two customers at NORAD/SPACECOM. Several problems were noted with the TLCs dropping out of synch and the attempt to bring up a ZICON line. Both of these problems were resolved by getting a new down-load module for the BR1731 multiplexer from Bunker-Ramo. A DYNATECH switch was installed to overcome the problems they were having with their redundant BR1731 channels. A modification to the FARM software was made and incorporated into the baseline which will allow routing to offices solely based on routing indicator.

3.2.6 REDCOM, MacDill AFB, Florida

On-site support was initiated at REDCOM during the month of April, 1982. The Mod 40 circuit to RDJTF was reconfigured as a full duplex channel through the BR1731 multiplexer. This necessitated a new down-load module from Bunker Ramo. A remote OJ-389 terminal was then installed in the CENTCOM area to provide this support instead of the Mod 40. This terminal has the same capabilities as the REDCOM OJ-389s but operationally only one queue is used. A major new capability is being designed and coded at REDCOM to provide a separation of traffic for the two commands, USREDCOM and USCENTCOM. This remote comm center capability will route to each terminal based on RI/OSRI for incoming traffic, messages in error and release authorization.

3.2.7 SAC, Offutt AFB, Nebraska

On-site support was initiated at SAC under this contract during the month of April, 1982. Actual on-site support was provided at SAC from the time of the original installation in 1978, however, this support was provided under a separate contract to SAC. In April, the separate SAC contract was terminated and SAC became a formal CUBIC/CSP user. Because of its proximity to the Informatics development facility, much of the support provided to SAC consists of implementing new software and running a thorough test and evaluation prior to actual incorporation into the CSP baseline. In this manner, SAC has been designated the lead command for all CSP developments. FARM and PLA were both accredited for R/Y use and were placed online. A new interface and gateway were implemented through a DMC-11 to the Micro Programmable Controller.

3.2.8 USAFE TFC, Germany

On-site support at the TFC was begun in July, 1983. During the initial few months of support, the ESD contractors were still on-site and making modifications to the Inter Computer Communications (ICC) gateway software. Therefore, Informatics' role was one of evaluation of the system and implementation of the baseline software. Actual baseline software support was provided during this period but no other modifications were supported. Upon successful accreditation of the entire system at the current release of CSP, full software support will be provided.

3.3 CDRLs

The following CSP documents were successfully completed and delivered during the contract period.

3.3.1 CSP Status Report (CDRL A001)

The CSP Contract Status Report was issued monthly and identified the status and activities for all tasks in progress in terms of performance, status and work planned for the next reporting period. Additional sections were included that identified management items of concern, a management level work summary, all CSP contract related travel and changes in project personnel.

3.3.2 CSP Overview (CDRL A002)

The CSP Overview provided an overview of system objectives and requirements suitable for management and general informational purposes. It was prepared in accordance with Data Item Description No. R&D-188-RADC.

3.3.3 Functional Description (CDRL A003)

The Functional Description provided a description of common system capabilities which were used to describe the system to potential users, to preview the system when training user personnel, to serve as a reference for user personnel and to provide a performance checklist after installation. Because this document was used by staff who did not necessarily have computer system experience, it was written using language which was as nontechnical as possible. It was prepared in accordance with Data Item Description No. DI-E-30104A.

3.3.4 System/Subsystem Specification (CDRL A004)

The System/Subsystem Specification provided a detailed definition of CSP functions and interfaces with other system and subsystems. It was in accordance with Data Item Description No. DI-S-30551A.

3.3.5 Program Specification (CDRL A005)

The Program Specification is a technical document used to guide programmers in developing code. The Program Specification was prepared in accordance with Data Item Description No. DI-S-30552A.

3.3.6 Test Plan (CDRL A006)

The Test Plan provides guidance for management and technical efforts throughout the installation, test and training period for each installation. The Test Plan establishes a comprehensive test plan so that users and security personnel can demonstrate and validate the operational capabilities of CSP. By defining and publishing a benchmark, against which the system can be made to perform, the process of DIA/DCA certification can be made simpler and more standardized for the user, while at the same time providing DIA/DCA with a well defined procedure and published, expected results. The Test Plan was published in accordance with Data Item Description No. DI-T-30703A.

3.3.7 Computer Operation Manual (CDRL A007)

The CSP Computer Operation Manual contained complete detailed information on the system console oriented towards computer operators who were responsible for the overall performance of the CSP and included appendices covering system error messages and system commands. The manual was prepared in accordance with Data Item Description No. DI-M-30402A.

3.3.8 Program Maintenance Manual (CDRL A008)

The CSP Maintenance Manual will present detailed program descriptions for all CSP modules and information on the maintenance of these modules. It is technical in nature and will be developed for personnel who were responsible for the maintenance of computer programs. This document, together with a program listing containing programmer comments, will assist the maintenance programmer in making modifications to the existing system programs as requirements change. The Maintenance Manual will be prepared in accordance with Data Item Description No. DI-M-30402A.

3.3.9 Configuration Management Plan (CDRL A009)

The CSP Configuration Management Plan (CMP) specified procedures for the achievement of the CUBIC CMP configuration management goals for the subset of all CSP software developed, disseminated and/or maintained by Informatics General Corporation under the CUBIC Management Program. The Configuration Management Plan was prepared in accordance with Data Item Description No. DI-E-3108.

3.3.10 Quality Program Plan (CDRL A010)

The Quality Program Plan identifies requirements and procedures for the software Quality Assurance Program. It was produced in accordance with Data Item Description No. DI-R-30510.

3.3.11 Test Analysis Report (CDRL A011)

The Test Analysis Report was produced by the Informatics team following accreditation testing of the CSP for new installations or new releases of CSP software. These reports consisted of a synopsis of test activities including a description of any problems encountered. The Test Analysis Reports were produced in accordance with Data Item Description No. DI-T-30704A.

3.3.12 CSP Operating System Upgrade and CSP Hardware Configuration Interim Technical Report (CDRL A012)

The CSP Operating System Upgrade Interim Technical Report contained results of an analysis to convert the CSP operating system to RSX-11M or RSX-11M+. The hardware configuration report addressed the capability to make certain software modifications related to a scaled down hardware version of the CSP. This technical report was prepared in accordance with Data Item Description No. DI-S-3591A/M.

3.3.13 Message Distribution Clerk, Multiplexer Interface, and History and Intercept Capabilities Interim Technical Report (CDRL A013)

Three reports were produced as part of this contract deliverable. The first consisted of a report on the feasibility of optionally supporting the Message Distribution Clerk functions via a single screen terminal. The second report addressed the capability to optionally interface to all communications interfaces and peripheral devices independently of the BR1569 or BR1731 multiplexer. The final report was provided on the capability of the CSP to optionally provide history and intercept functions utilizing a disk as opposed to tape. The Technical reports were prepared in accordance with Data Item Description DI-S-3591A/M.

3.3.14 Ancillary Control Processor and Message Recall Interim Technical Report (A014)

The Technical Report consisted of the results of an analysis to provide message recall and retransmission based on communication requests to the CSP. This report was produced in accordance with Data Item Description No. DI-S-3591A/M.

3.3.15 Direct AUTODIN Interface Interim Technical Report (CDRL A015)

The Technical Report for the feasibility of a direct software interface to an AUTODIN Switching Center (ASC) was to include results of an analysis effort projecting impacts on memory utilization,

throughput, efficiency and security accreditation. The report was not prepared due to the consensus of users at the August 1983 CSP Users Conference to place this item on hold.

3.3.16 Final Technical Report (CDRL A016)

This Final Technical Report (FTR) for the CSP Support contract summarizes the results of work performed during the contract period. This report identifies CSP capabilities and deliverable products that were produced.

3.3.17 Training Course Outline (CDRL A017)

A Training Course Outline was produced which consists of an outline of training to be provided to both programmers and operators. It was produced in accordance with Data Item Description No. DI-H-5060.

3.3.18 Training Material (CDRL A018)

Training Material was provided to both operators and programmers. It included a slide presentation, operator positional reference guide, and exercise scenarios for the student and training official. The training material was prepared in accordance with Data Item Description No. DI-H-5061.

3.3.19 Users Manual (CDRL A019)

The CSP Users Manual contains complete detailed information on the MDC/SVC terminal to successfully operate the CSP. It was oriented towards message distribution personnel who are responsible for the efficient performance of the CSP and includes appendices covering message distribution terminal error messages. The Users Manual was prepared in accordance with Data Item Description No. DI-M-30401A.

3.3.20 Interface Control Document (CDRL A020)

The Interface Control Document will consist of a summary for interface control to the MAXI. This document will be published during the next phase of the contract to coincide with the completion of the analysis of the CSP/MAXI interface task in Option 1. It will be completed in accordance with Data Item Description No. DI-E-30131.

3.3.21 Work Plan (CDRL A021)

The Work Plan consists of a planned approach for the successful completion of each task. It provides the following information: task plans, technical approach, task breakdown and schedule estimate,

deliverable products and delivery dates, resource estimates, projected travel and machine time requirements. The Work Plan was produced in accordance with Data Item Description No. R&D-58A-RADC.

SECTION 4. Summary and Recommendations

Reviewing the accomplishments of this phase of the current contract reveals that many tangible improvements have been made to CSP which brings more flexibility into the configuration and operation of the telecommunications center. An alternative to magnetic tapes is now available for any site not wishing to operate with tapes. A fully redundant system can be configured using only disk media or using both disk and tapes. Alternatives are also being developed for the BR1569/BR1731 multiplexer. When completed, this will offer a choice to any prospective CSP user or any current user wishing to expand capabilities. Significant advances were also made in development of a single-screen terminal capability as an alternative to the large, expensive OJ-389. This terminal, a Delta-Data 8252T, will offer a plug-compatible alternative at about one-fifth the cost of the current requirement.

Another visible improvement has been the modifications designed for transportability. The CSP software can be installed, configured and made test ready in under half a day and be done in a fashion which provides complete audit trail and configuration management information.

From a functionality standpoint, it can be seen from the above that significant improvements have been made to the CSP. To the aforementioned list could be added numerous other improvements of a lesser nature, but nonetheless supporting the evolution of CSP from a relatively primitive communications processor to an automated full function communications system.

Throughout this evolution the design and implementation process has included considerable thought toward anticipation of future requirements. For example, while the PLA capability was not scheduled for completion until late 1982, the foundation for PLA, in terms of data structure modifications and other "hooks", was laid as far back as 1980. This has allowed integration with virtually no impact anticipated on existing installations when upgrading to PLA. Release 2.3 of CSP has included, of course, PLA, FARM and many other enhancements, but it also included "hooks" for future anticipated expansion. Several changes have been anticipated and the foundations laid for running CSP on a smaller hardware configuration, elimination of the History/Intercept tape requirement and modifications to the MDC terminal operations.

CSP has been evolving along other lines besides functionality. The original CSP for SAC was fairly restrictive as to the hardware configuration it required for operation. For instance, usage of other than DEC TU10 tape drives for history and intercept required software changes. Today, CSP is much less restrictive as to hardware requirements. With consideration given to performance and capacity



requirements, CSP can be offered as a system able to run on the entire family of PDP-11 processors (except for 11/23 and 11/24 because of IAS operating system constraints). CSP can use, as a message file data base, any disk drive supported by the operating system and the same holds true for mag-tape devices. Because CSP was designed for device independence, it can take immediate advantage of new peripheral offerings as soon as they become available with operating system support.

With the advances in hardware/software technology projected to proceed at their current phenomenal rate, it will not be long before the current CSP hardware/software architecture will be updated with respect to available technology.

From a hardware standpoint the industry move is, and always has been, towards more processing power in smaller packages. Much more emphasis is being placed on distributed processing techniques in an effort to expand the capabilities of these smaller processors, as well as limit the reliance on a single processor for all functions. The other obvious use of distributed processing is to get more capabilities to more people.

Software is also undergoing a change in terms of how people view its use. With the current evolution of higher order languages (HOLs), the frequency of machine language (MACRO-11, BAL, etc.) implementations of computer programs will drop dramatically as more powerful and flexible HOLs become available. Machine language has historically been selected for use because of its efficiency and ability to manipulate the hardware and small units of data (bits, bytes, etc). It was also, in many cases, the only language available on minicomputers in the early stages of development. This is rapidly changing, however, and the time is not far off when machine language will be a tool used only by the hardware designer when building the machine itself. Consider the DEC VAX 11/780 which implements sophisticated data structure manipulation operations in its instruction set, or the Commercial Instruction Set (CIS) option for the PDP-11/24 and 11/44. Many microprocessors are commercially available that offer the PASCAL, BASIC and "C" languages implemented in firmware which cannot be easily programmed in machine language. A major drawback to machine language has been and, by definition, will continue to be, cost. While it is generally efficient in its operational form, the cost to develop it continues to escalate as labor costs rise. Machine language programmers are hard to find and good ones demand high salaries. The efficiency of machine language is directly dependent upon programmer expertise while with higher order languages a large amount of efficiency can be "built in" to the compiler and the language itself. Another drawback to machine language is dependency. For example, software coded in PDP MACRO-11 cannot be executed on anything but a

PDP-11. This is not necessarily true of HOLs. A program written in "C", PASCAL, or ADA will run on a variety of computers supporting that language.

Where does this all fit with CSP? One can begin by looking at the user. Telecommunications centers serve a vital but relatively minor role in the process of intelligence information gathering and dissemination. The message traffic itself is merely data until it gets into the hands of the intended recipient where its true value comes into play. Many of the processes taking place in a communications center require significant manpower allocation but represent minor capabilities for computer systems. As these TCC processes are translated into software, less effort need be expended on moving data and more can be spent on developing the tools for using it.

Most communication centers have limited space that must be shared between people, communications equipment, administrative offices etc and finding room for two PDP-11/70 systems can be a problem. It is, therefore, incumbent upon system designers to provide more compact and efficient systems which get the job done but do not have the impact on space of the current larger systems. Coupled with smaller size and increased performance, is a constant requirement to reduce costs both in hardware procurement/operation and in software development and maintenance.

Cost reduction and performance improvement can be accomplished through use of newer, smaller, more powerful equipment including distributed processing techniques and through other techniques such as software preparation in a suitable higher order language such as ADA. The result will be a very efficient (in cost, space and performance) system with wide flexibility and applicability.

To a certain extent CSP stands at a crossroads with respect to future evolution. In its current state CSP is a solid, well defined system. If TCC requirements were never to change and currently used hardware continued to be available, then CSP could continue to be a viable system. However, neither of the above premises are true and some decisions must now be made concerning the evolutionary path to take. No single path represents a clear-cut decision. On one hand there is strong support for migration of CSP to smaller hardware which would give the same or slightly more capability than the current system. This makes sense from the standpoint that the hardware is moving in that direction and TCC's don't usually have physical space to spare. On the other hand, changing TCC requirements such as consolidation of DSSCS/GENSER facilities as well as overall expansion of communication requirements tends to support the move of CSP to larger, faster hardware. In its current form, using current 21(V)

hardware, CSP is throughput limited to perhaps 6000-8000 messages/day. This is adequate for most applications but clearly inadequate for many potential users.

It is, of course, a well known fact that DOD is pursuing a solution to the current AUTODIN/Tributary problem with development of the Inter-Service/Agency AMPE. CSP is the interim standard AMPE and, as such, is scheduled to be replaced by I-S/A AMPE, or is it? Even though I-S/A AMPE would automate TCC's as well as serve as switching nodes for the DIN network, does that eliminate the requirement for message processing systems connected to I-S/A AMPE? Today, CSP provides 70% of the functionality projected for I-S/A AMPE and rough estimates for I-S/A AMPE operation are for the late 1980's; CSP will have to provide service until then.

The work items identified in the next phase of this contract represent some real direction in this decision making process. Conversion of CSP to a higher order language is an absolute necessity. It must be pursued with serious dedication. ADA represents the clear-cut choice of languages. Lack of approved compilers is a temporary problem, but it is anticipated that very shortly the computer manufacturers will begin to make available accredited ADA compilers along with the necessary development tools. The problem of hardware dependence must be resolved. This will, in fact, be partially alleviated by conversion to a HOL but more work must be done in order to use standard, vendor supplied options; thus removing the reliance on unique (expensive) sole source equipment.

For CSP, the past few years of work have seen the overall organization and stabilization of the system into a well defined product. New capabilities were added in a methodical and well planned fashion. With respect to functionality, CSP is now mature. The work to be performed over the next several years must focus on evolution towards refinement of the technology and expansion of applicability and flexibility.

HQ SAC, Offutt AFB, Nebraska

Site Location

The CSP became operational at HQ Strategic Air Command (SAC) in September 1978. The CSP was developed at HQ SAC as part of the Operational Intelligence Support System (OISS) of the IDH Improvements Project.

SAC has a world-wide mission of deterring war by being prepared to conduct strategic operations on a global basis with the objective of destroying an enemy's will or capability to wage war.

CSP provides both DSSCS and GENSER communications support for transmission and reception of real-time AUTODIN messages in support of SAC's mission. In addition, the CSP functions as a front-end processor for the Analyst Support Processor (ASP), which directly supports SAC's intelligence analysts.

Equipment Configuration

The CSP at SAC is currently implemented on the following hardware for the primary system:

- o CPU - One (1) PDP-11/70 with 256K memory
- o System console - One (1) LA120 DECwriter
- o Disk drives - Three (3) BR1538D (shared)
One (1) RL01
- o Tape drives - Two (2) TE16
Three (3) TU10 (shared)
- o Multiplexer - One (1) 36-channel BR1569
- o Line printers - One (1) LP11WA (shared)
One (1) B600
One (1) TT Mod-40 ROP (shared)
- o AUTODIN Interface Device - Two (2) TLC100 (shared)
- o Message Distribution Console - Three (3) OJ-389 (shared)
- o Other Equipment - One (1) VT52 terminal
One (1) paper tape reader/punch
One (1) CR11 card reader (shared)

The backup system is configured identically to the primary. Those items listed as "shared" above are switchable between the two processors. Additionally, individual circuits terminating in the BR1569 multiplexer are switchable between both processors by means of BR1568 switches.

Software Configuration

Figure A-01 contains a site report extracted from Informatics' Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation, and a status of pending releases. Also included are any site unique modules developed for this particular site.

Communications Configuration

The CSP is dual-homed to Tinker and Gentile ASCs for online tributary operations, both DSSCS and GENSER. Backside tributaries at SAC include the ASP, Mode II send and receive circuits, and a Micro Programmable Controller (MPC) to interface to SOLARS.

A connectivity diagram for SAC is presented in Figure A-02.

Current Operations Statistics

SAC's average traffic volume and CIM rate are as follows:

- o Messages transmitted - 1569 per month
- o Line blocks transmitted - 112,086 per month
- o Messages received - 56,301 per month
- o Line blocks received - 1,421,982 per month
- o CIM Rate - .57%

The CSP is able to maintain approximately 37 days of online storage. SAC has been able to maintain a low CIM rate due to the extensive format and security checks performed by the CSP.

Approximately 75% of the incoming messages are derivatively routed to the ASP. Another 5-7% are derivatively routed to the SOLARS system. Approximately 5% of the incoming messages are derivatively routed to the SRC. The remainder of the incoming messages is routed by the FARM software or the message distribution clerk.

SITE: SAC (SA)

RELEASE: 2.3

STATUS: OPERATIONAL 15-APR-83

DATE OF INSTALLATION: 15-APR-83

REMARKS: NONE

UNIQUE MODULES:

NONE

OUTSTANDING PROBLEM REPORT:

CM #: SA-82-0005

STATUS: ENHANCEMENT

DESCRIPTION:

SUGGEST ALL SYSTEM HISTORY STATS AND LML'S BE GENERATED IN AUTODIN MESSAGE FORMAT HOURLY (WITH 60 MINUTE'S DATA) AND RECORD ON BOTH DISK AND HISTORY TAPE. ADDITIONALLY, ONE COMPLETE LML SHOULD BE GENERATED AT RADAY AND RECORDED ON TAPE AND DISK — AS WELL AS BEING PRINTED ON THE SERVICE PRINTER (SVP). THE MESSAGE COULD BE IN EITHER DSSCS OR GENSER FORMAT, ACCORDING TO LOCAL REQUIREMENTS AND CONTENT.

THIS ENHANCEMENT IS SCHEDULED FOR BASELINING.

CM #: SA-82-2001

STATUS: UNDER ANALYSIS

DESCRIPTION:

WHILE ATTEMPTING TO SERVICE A BACKSIDED MODE II TERMINAL USING MESSAGE RECALL ON A MESSAGE THAT HAD BEEN RECENTLY PROCESSED THRU THE SYSTEM, OLD MESSAGES WERE ERRONEOUSLY RECOVERED.

ECD: 1-DEC-83

CM #: SA-83-2002

STATUS: ENHANCEMENT

DESCRIPTION:

WHEN USING 'LOGGEN', THE INFORMATION IS PRNTED AS IT IS READ FROM TAPE. THIS PRODUCES A PRINTOUT THAT IS DIFFICULT TO READ AND IS NOT IN ORDER BY MESSAGE. ALSO, OPERATORS ARE UNABLE TO SELECT A PORTION OF A TAPE TO LOG.

THIS ENHANCEMENT IS UNDERGOING TESTING BEFORE BASELINING. IT IS INTENDED AS AN OFF-LINE JOB. ONCE ON-LINE, GIVE RECOMMENDATIONS.

CM #: SA-83-2003
STATUS: ENHANCEMENT
DESCRIPTION:

SUGGESTION TO PROVIDE FARM WITH THE OPTION TO ALLOW MANUAL PROCESSING OF CERTAIN CODEWORDS AND CLASSIFICATIONS.

THIS SHOULD BE A CURRENT CAPABILITY. CURRENTLY UNDERGOING INFORMATICS EVALUATION.

CM #: SA-83-2004
STATUS: UNDER ANALYSIS
DESCRIPTION:

AFTER A GENSER MSG CONTAINING MORE THAN ONE PAGE IS PROCESSED BY PLA, PLA DOES NOT ADD THE SPECIAL HANDLING DESIGNATORS OF THE MSG ON PAGE 2 OR ANY SUCCEEDING PAGES. EXAMPLE: MESSAGE CLASSIFICATION, S E C R E T NOFORN WNTNTEL. PAGE 2 IS PROCESSED AS S E C R E T VICE S E C R E T NOFORN WNTNTEL.

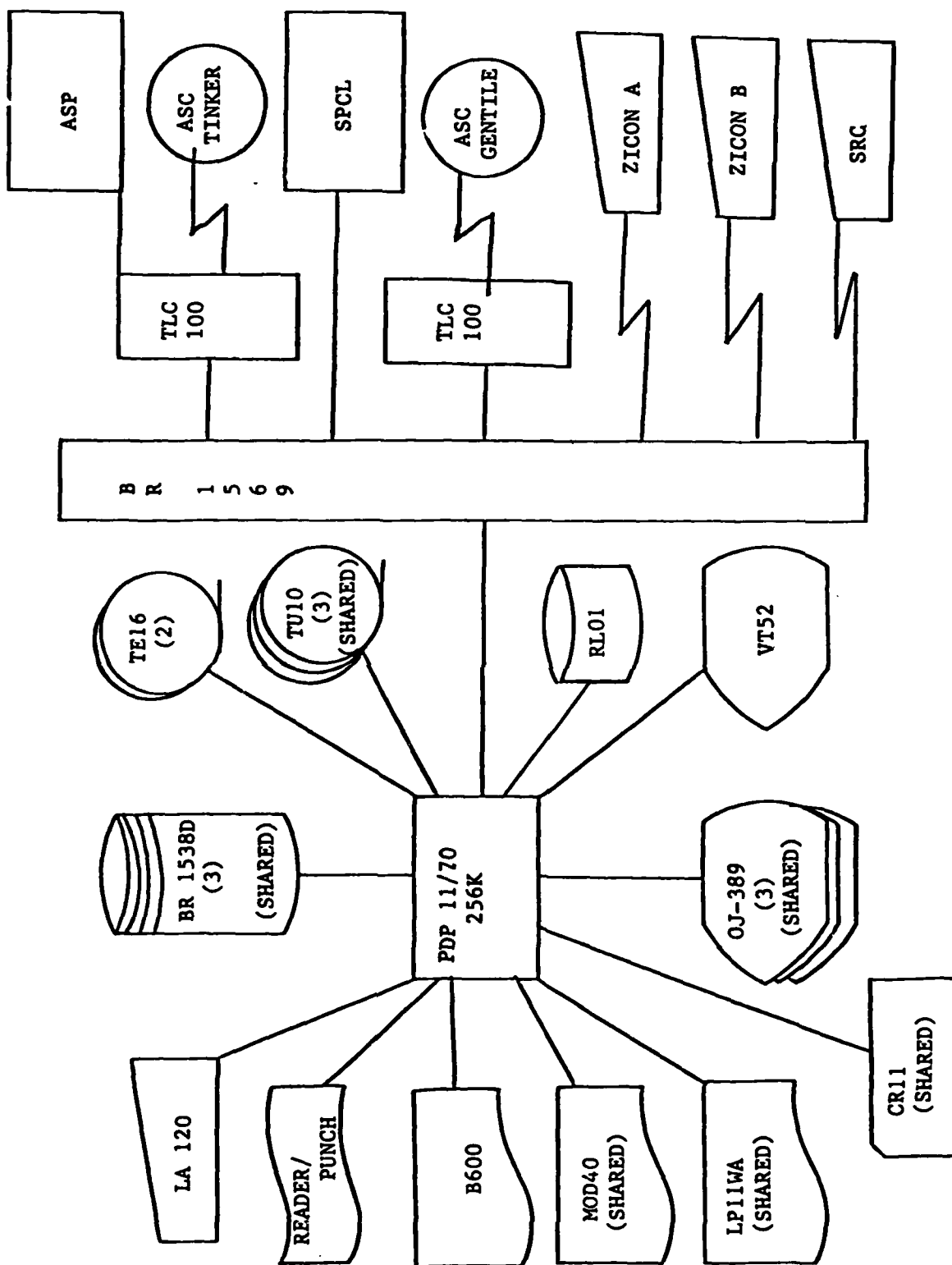


Figure A-02 SAC Connectivity Diagram

The station reliability for SAC including both hardware and software outages is approximately 99.64%.

Future Operations

There are plans to replace the interface to the ASP with a DDCMP protocol gateway utilizing the BR1569 multiplexer. This gateway will also implement a full-duplex capability, allowing ASP to transmit DD Form 173 messages through CSP to AUTODIN. Messages will be given release authorization at the CSP prior to introduction into AUTODIN.

Site Personnel

There are no CUBIC/CSP on-site representatives per se at SAC. The close proximity of the Bellevue facility to SAC makes it possible for the personnel at the contractor's facility to assist in system trouble shooting. This effort is conducted largely by Mr. Barry King, PRC. Mr King works closely with the communications and data processing staffs of SAC. His primary point of contact is 1st Aerospace Communications Group.

HQ MAC, Scott AFB, Illinois

Site Location

CSP was installed at HQ Military Airlift Command (MAC) in June 1979. This was the second installation of CSP after SAC successfully demonstrated the ability of the CSP to the military intelligence community.

MAC has a world-wide mission of providing airlift, logistic, supply and transport support to all DOD elements. A secondary mission consists of supporting Air Force Communications Command, Air Rescue and Recovery Service and Air Weather Service components.

CSP provides both DSSCS and GENSER communications support for transmission and reception of real-time AUTODIN messages in support of MAC's mission. In addition, the CSP functions as a front-end processor for the MAXI system, which directly supports MAC's intelligence analysts.

Equipment Configuration

The CSP at MAC is currently implemented on the following hardware for the primary system:

- o CPU - One (1) PDP 11/70 with 256K memory
- o System Console - One (1) LA36 DECwriter
- o Disk Drives - One (1) BR1538D
- o Tape Drives - Three (3) TU16
- o Multiplexer - One (1) 32 channel BR1569
- o Line Printers - Two (2) 80 character line printers
- o AUTODIN Interface Device - One (1) TLC100
- o Message Distribution Console - Two (2) OJ-389
- o Other equipment - One (1) VT52 terminal
One (1) Paper tape reader/punch

There is currently no backup processor to be used in the event the PDP 11/70 or one of its peripherals is down. If the down-time is excessive, a PDP 11/70 used to support MAXI can be recabled to run CSP.

Software Configuration

Figure A-03 contains a site report extracted from Informatics Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation and a status of pending releases. Also included are any site-unique modules developed for this particular site.

Communications Configuration

The CSP is homed to ASC Gentile for online operations, both DSSCS and GENSER. The only backside tributary at MAC is the MAXI system. There are no other local tributaries or communications lines configured at this time.

A connectivity diagram for MAC is presented in Figure A-04.

Current Operations Statistics

MAC's average traffic volume and CIM rate are as follows:

- o Messages transmitted - 1,225 per month
- o Messages received - 25,225 per month
- o CIM rate - .33%

The traffic volume has been steadily increasing at the rate of 10-15% per year, while the CIM rate has been declining dramatically. This decrease in CIMs is largely due to the increased format checking and stricter security checks placed on each message by the CSP.

With MAC's current message volume and single disk configuration, the online message storage capacity is approximately 37 days.

Virtually all of the incoming messages are reviewed and routed by the MDC operator. However, approximately 90% of these messages are routed to the MAXI system.

The station reliability rate for MAC has averaged 97.4%. This reflects total system reliability and includes both hardware and software downtimes as well as PMIs.

Future Operations

One change anticipated is to obtain a second TLC100 and a link to Tinker ASC and become dual-homed to provide redundancy and faster service.

SITE: MAC (MA)

RELEASE: 2.3A

STATUS: OPERATIONAL 23-SEP-83

DATE OF INSTALLATION: 16-SEP-83

REMARKS: NONE

UNIQUE MODULES:

NONE

OUTSTANDING PROBLEM REPORT:

CM #: MA-83-2009

STATUS: PROBLEM ON HOLD

DESCRIPTION:

WHEN THE MDC/SVC OPERATOR IS ROUTING TRAFFIC, THE LEFT SCREEN DISPLAYS 'QUEUE EMPTY'. THE QUEUE MESSAGE COUNTER INDICATES THAT THERE IS STILL TRAFFIC IN THE QUEUE. ATTEMPTS AT REVIEWING THE REMAINING MESSAGES ON THE QUEUE BY GOING FROM THE AFFECTED QUEUE TO ANOTHER AND BACK WILL NOT CORRECT THE DIFFICULTY. ON OCCASION, IF THE MDC/SVC OPERATOR WAITS UNTIL THE QUEUE BUILDS BACK UP (8-10 MSGS), ALL TRAFFIC CAN BE REVIEWED AND ROUTED.

NO ECD, CANNOT DUPLICATE PROBLEM.

CM #: MA-83-2010

STATUS: UNDER ANALYSIS

DESCRIPTION:

AFTER RECEIPT OF A BAD MESSAGE, WE WOULD BE NOTIFIED BY THE ASG THAT THEY WERE RECEIVING 'STOPS' FROM US, THUS INTERRUPTING THE TRAFFIC FLOW. WHEN THE 'MASTER CLEAR' WAS PRESSED ON THE TLC, WE WOULD FIND ONLY A PARTIAL MESSAGE HAD BEEN RECEIVED AND ATTEMPTS TO CAPTURE THE MESSAGE IN THE DATA SCOPE WERE UNSUCCESSFUL. WE WERE INFORMED BY THE ASC THAT THE MESSAGE CONTAINED AN 'EM' CHARACTER (SHORT BLOCK CHARACTER) WHICH THE ASC IS ABLE TO TRANSMIT BUT OUR SYSTEM CANNOT ACCEPT.

ECD: NOT ESTABLISHED

Figure A-03 MAC Configuration Status

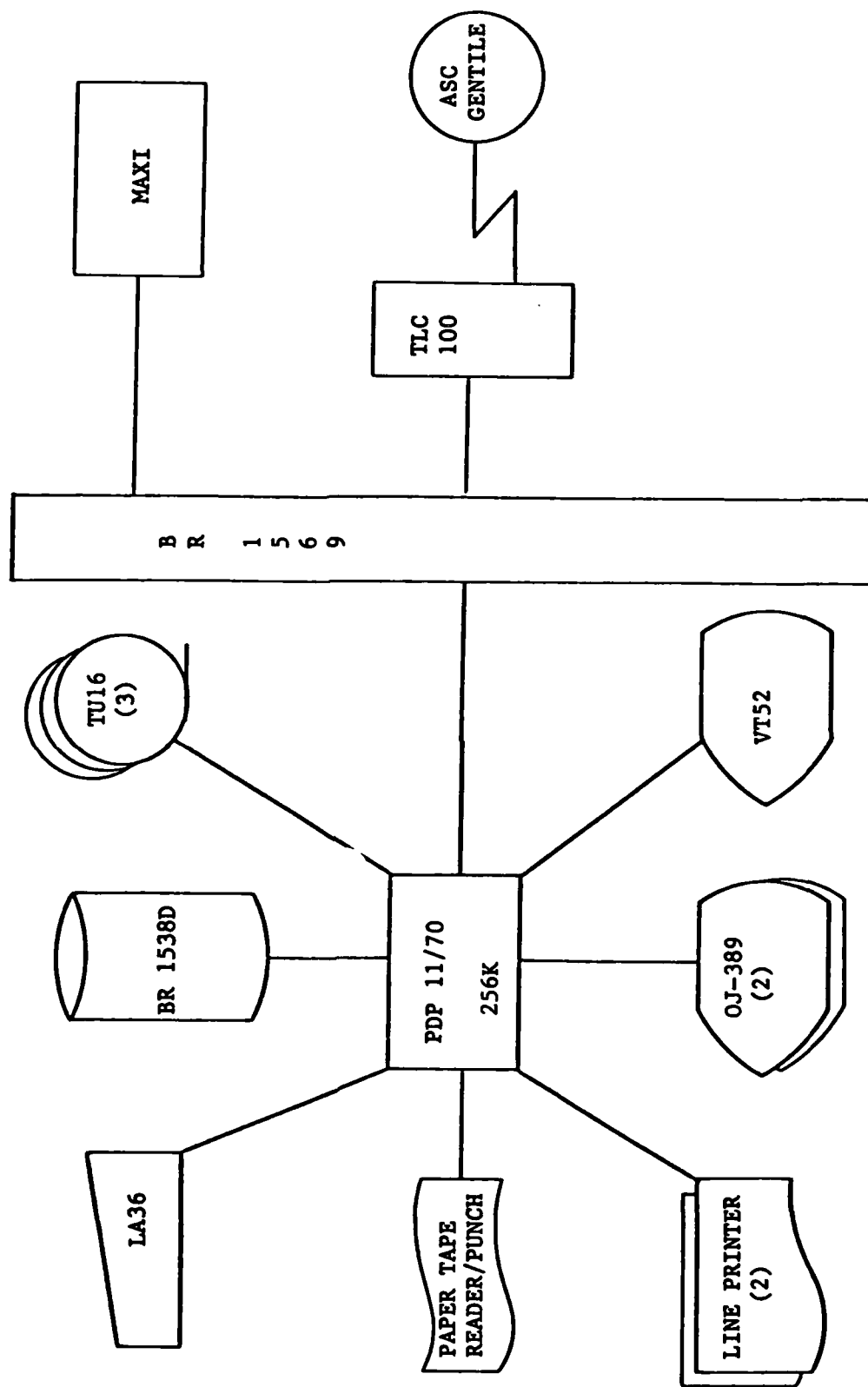


Figure A-04 MAC Connectivity Diagram

Site Personnel

The current CUBIC/CSP on-site representative at MAC is Mr. David Wittenberg, Informatics. He has just recently replaced Mr. Charles Ramsey, Informatics who relocated to the Bellevue central development staff.

Mr. Ramsey has been instrumental in the high rate of success that CSP has achieved at MAC. He has performed problem analysis and resolution in a timely manner and has responded around-the-clock to online system problems. He has also converted the system to run on the PDP-11/45 on a test basis which confirmed that operational implementation on that processor is not feasible.

His day-to-day operations require him to interact with several intelligence divisions as well as data automation and communications center personnel.

TCATA, Fort Hood, Texas

Site Location

CSP was first installed in November, 1979, at the TRADOC Combined Arms Test Activity (TCATA), Fort Hood, Texas on a PDP-11/45. During September-October, 1981, the CSP software was moved to the home station PDP-11/70. In early November, 1981, TCATA was re-accredited by DCA, DIA and DA. In April, 1982, TCATA installed CSP in the Remote Communications Package (RCP), which was designed by our on-site consultant, Russell Goad, prior to his release from active duty. In September 1983, TCATA was reaccredited to allow "GENSER only" remote communications lines

TCATA's CSP primary mission is to provide a communications interface with user units during J.C.S., REDCOM and other units' exercises. TCATA's CSP also has a mission in testing the Joint Tactical Fusion Test Bed (JTFTB) located at both Fort Hood and Hurlbert Field, Florida.

Equipment Configuration

The local CSP at TCATA has the following hardware configuration:

- o CPU - One (1) PDP-11/70 with 2MB memory
- o System Console - One (1) LA36 DECwriter
- o Disk Drives - Two (2) BR1538D
- o Tape Drives - Two (2) Kennedy dual density drives (equivalent to TE16s)
- o Multiplexer - One (1) 32 channel BR1569
- o Line Printers - One (1) Houston Instrument electrostatic
- o AUTODIN Interface Device - One (1) TLC100
- o Message Distribution Console - One (1) OJ-389
- o Other equipment - One (1) VT100 terminal
One (1) DV11 multiplexer

The Remote Communications Package (RCP) CSP is configured slightly differently:

- o CPU - One (1) PDP-11/70 with 1 MB memory
- o System Console - One (1) LA36 DECwriter
- o Disk Drives - Two (2) BR1538D
- o Tape Drives - Two (2) Kennedy dual density drives (equivalent to TE16s)
- o Multiplexer - Two (2) 16 channel BR1569
- o Line Printers - One (1) LP11Y
- o AUTODIN Interface Device - One (1) TLC100
- o Message Distribution Console - One (1) OJ-389
- o Other Equipment - One (1) VT100 terminal
One (1) DV11 multiplexer

Software Configuration

Figure A-05 contains a site report extracted from Informatics Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation and a status of pending releases. Also included are any site-unique modules developed for this particular site.

Communications Configuration

The connectivity of the two CSPs at TCATA varies depending on the exercise being supported. Generally, however, there is a link to one ASC and anywhere from one to eight MOD-40 teletypes configured as Mode II devices. Also, if the exercise dictates, there could be a satellite CSP-to-CSP link activated via the satellite communications gateway.

The backside computer interface at the local CSP consists of a receive link from the PDP-11/70 configured as a Tactical Simulator (TACSIM) Output Message Control and Timer (TOMCAT). During exercises the TACSIM processor, a VAX 11/780, generates messages through the TOMCAT which releases them to CSP on a timed, controlled basis. CSP then forwards them to their destination.

SITE: TCATA (TT)

RELEASE: 2.3A

STATUS: OPERATIONAL 16-SEP-83

DATE OF INSTALLATION: 16-SEP-83

REMARKS: INSTAL. AND OPERATIONAL DATES WERE FOR THE MAIN VAN.
THE RCP WAS INSTALLED AND OPERATIONAL ON 23-MAY-83

UNIQUE MODULES:

NONE

OUTSTANDING PROBLEM REPORT:

NONE

Figure A-05 TCATA Configuration Status

The local lines consist of the MOD-40 teletypes mentioned above which can be operated either locally or remotely. An additional backside tributary off the RCP is a PDP 11/24 configured to support multiple VT100 message generation terminals and a plotter.

A connectivity diagram for TCATA is presented in Figure A-06.

Current Operations Statistics

Since TCATA is not an operational site, there is not a constant traffic load. However, during the exercise periods, the TCATA CSP handles approximately 1800 to 2000 messages per day. If this volume were sustained for an extended period this equates to 54,000 to 60,000 messages per month, or almost double the average volume for most CSP sites. CIM rates are not calculated during exercise periods, so none are available.

The hardware and software reliability has been excellent at TCATA. During the two and one-half years that CSP has been used at TCATA, there has never been a time that TCATA has not been able to support its users due to software or hardware downtimes. The only system outages have been caused by communications line outages.

Given the high message volume and the small amount of disk storage allocated for the message file, the current configuration allows for approximately 50 days online storage.

Approximately 99% or virtually all of the messages received are automatically or derivatively routed by the CSP. This requires very little operator intervention.

Future Operations

An analysis is underway to replace the PDP-11/70 in the RCP with a daisy chain of PDP-11/44s and 11/24s. As the RCP is deployed, more information will be gathered on the evolution of the CSP in the tactical environment.

Site Personnel

At the present time the on-site representative at TCATA is Ms. Elizabeth Crenshaw, Informatics; however, she is scheduled for reassignment and will be replaced in November 1983 by Mr. Robert Richards.

The on-site personnel have made several significant accomplishments. From the time CSP was first installed on the TCATA PDP-11/45 system in November, 1979, and deployed for its first major successful exercise to Europe, January 1980, Informatics trained

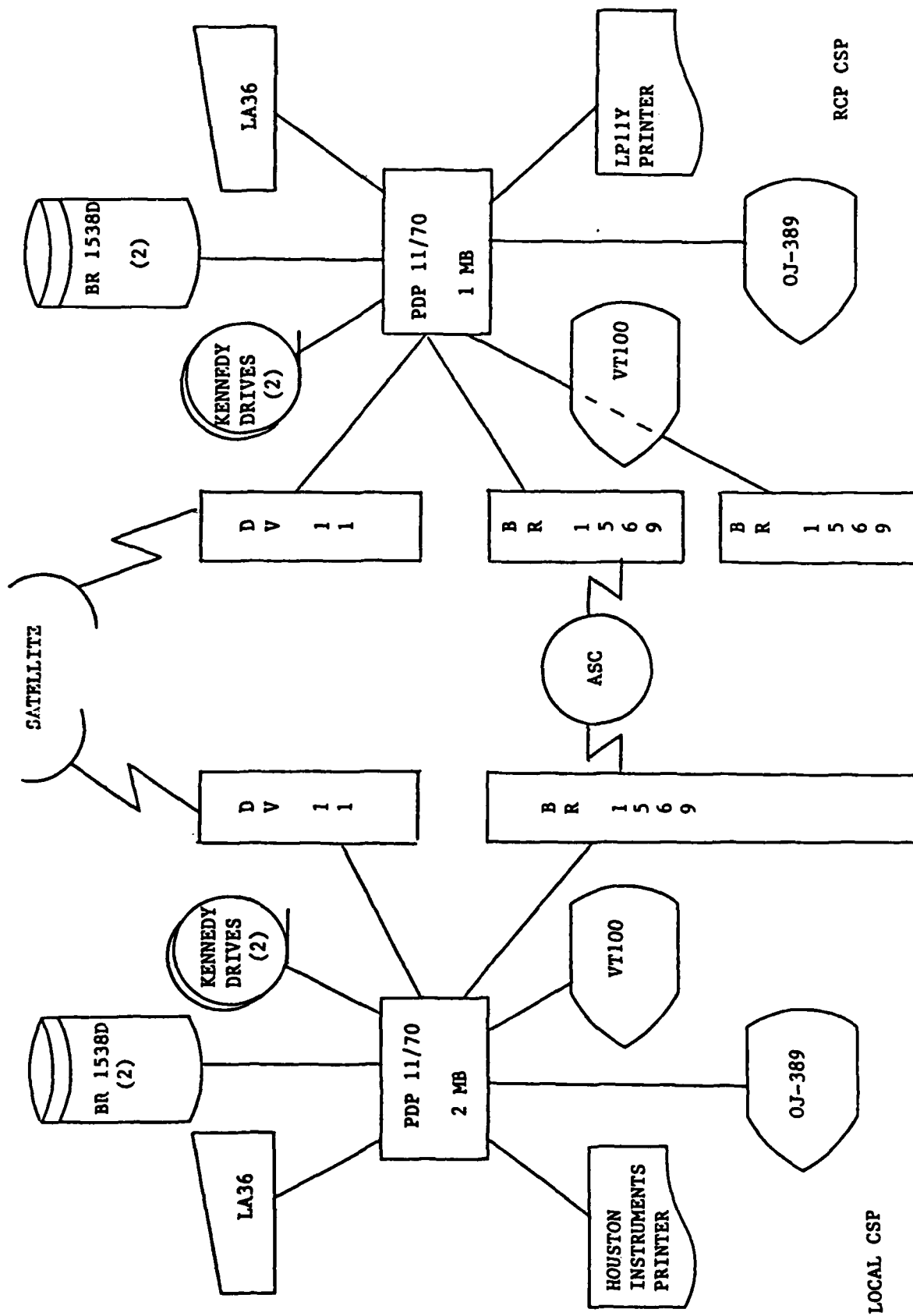


Figure A-C6 TCATA Connectivity Diagram

TCATA's operators and assisted TCATA in passing its first AUTODIN accreditation test. During the fall of 1980, Informatics was given the task of writing a gateway to interface with the TCATA TOMCAT, a replacement for SSB. In the fall of 1981, Informatics was again tasked to write a site unique gateway, SCMCON. This gateway allowed CSP-to-CSP communications over a Satellite link. Informatics also assisted in integrating the CSP software onto the same computer system as the TOMCAT resides. In November of 1981, the present system successfully passed a Category III AUTODIN accreditation test.

During day-to-day operations the Informatics personnel interface with the user organization through the Systems and Computer Operations branch of the Battlefield Automation Test Directorate, TCATA. They work very closely with several branches of the Special Projects and Simulation Division as well as contractors from Eaton Corporation and BDM.

USAFE, Ramstein AB, Germany

Site Location

CSP was installed at HQ United States Air Force Europe (USAFE), Ramstein AB, Germany in August, 1981. It is located in the USAFE Combat Operations and Intelligence Center (COIC) and supports the intelligence analysts by providing a communications path to AUTODIN for transmission and reception of AUTODIN messages.

The primary function of CSP is to be the front-end processor for the MAXI system at USAFE and to support various intelligence communications circuits. A secondary role is the automation of the AFSSO TCC at USAFE.

Equipment Configuration

The USAFE CSP is configured on the following hardware:

- o CPU - One (1) PDP-11/70 with 256K memory
- o System Console - One (1) LA36 DECwriter
- o Disk Drives - Four (4) BR1538C
Two (2) RK05
- o Tape Drives - Three (3) TE16
- o Multiplexer - One (1) BR1569
- o Line printers - One (1) LP05
- o AUTODIN Interface Device - Two (2) TLC100
- o Message Distribution Console - Three (3) OJ-389
- o Other Equipment - One (1) VT100 terminal

An additional PDP 11/70 configured identically serves as a backup.

Software Configuration

Figure A-07 contains a site report extracted from Informatics Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation and a status of pending releases. Also included are any site-unique modules developed for this particular site.

SITE: USAFE COIC (CO)

RELEASE: 2.3A

STATUS: OPERATIONAL 15-AUG-83

DATE OF INSTALLATION: 15-AUG-83

REMARKS: NONE

UNIQUE MODULES:

NONE

OUTSTANDING PROBLEM REPORT:

CM #: CO-82-0002

STATUS: ENHANCEMENT

DESCRIPTION:

SUGGESTION TO ALLOW A SUBSET OF MESSAGES TO BE READ OFF OF THE
INTERCEPT TAPE BY ORIGINAL QUEUE ASSIGNMENT.
THIS ENHANCEMENT IS UNDERGOING TESTING AT THE BELLEVUE FACILITY.

CM #: CO-82-2020

STATUS: UNDER ANALYSIS

DESCRIPTION:

WHEN A MESSAGE IS PREPARED WITH A TRC CODE OF 'TTBB' ORR 'TTXX' AND ALSO
INCLUDES THE SPECAT OVERRIDES /FFFF OR /LLLL, THE CSP IGNORES THE
OVERRIDES AND PREVENTS TRANSMISSION OF MESSAGE.
ESTIMATED COMPLETION DATE: 1-NOV-83

CM #: CO-83-2026

STATUS: UNDER ANALYSIS

DESCRIPTION:

SUGGESTION TO AUTOMATICALLY SWITCH TO A SECONDARY PATH WHEN THE DIN
PATH IS DOWN.
ESTIMATED COMPLETION DATE: NOT ESTABLISHED.

CM #: CO-83-2027

STATUS: ENHANCEMENT

DESCRIPTION:

THE NUMBER OF MESSAGES WRITTEN TO AN INTERCEPT TAPE IS PROVIDED ONLY AFTER
THE TAPE HAVE BEEN CLOSED. THIS SUGGESTION IS TO PROVIDE THE INFORMATION
DYNAMICALLY WHILE THE TAPE IS OPEN AND BEING WRITTEN TO.
ESTIMATED COMPLETION DATE: 1-DEC-83

CM #: CO-83-2028

STATUS: ENHANCEMENT

DESCRIPTION:

SUGGESTION TO ALLOW 1600 BPI AS WELL AS 800 BPI SUPPORT BY MTPCON TO MAINTAIN COMPATABILITY WITH THE NEW HOST HARDWARE CONFIGURATION.
ESTIMATED COMPLETION DATE: 1-NOV-83

CM #: CO-83-2032

STATUS: PROBLEM ON HOLD

DESCRIPTION:

FREQUENTLY WHEN ONE OF OUR BACKSIDE TRIBUTARIES IS DOWN FOR MAINTENANCE, WE MUST ALTROUTE ALL TRAFFIC TO AN INTERCEPT TAPE. WE WOULD LIKE THE ADDITIONAL CAPABILITY TO ALTROUTE FLASH AND IMMEDIATE PREC TRAFFIC TO THE PRINTER FOR IMMEDIATE DELIVERY. CURRENTLY, WE MUST TAKE INFO CONCERNING FLASH TRAFFIC FROM THE SVP, RECALL THE MSG, THEN DO A MANUAL DISTRIBUTION OF THE MSG TO THE MDP PRINTER IN ORDER TO GET THE CLASS STAMPING ON THE PRINTOUT. THERE IS NO WAY TO TRAP IMMEDIATE TRAFFIC.

EXAMPLE OF THE NEED: MCR> ALR MXI TO INT/PRE=P,L
MCR> ALR MXI TO MDP/PRE=I,H

WITHOUT THIS CAPABILITY, AN ERROR MSG IS GENERATED STATING QUE ALREADY ALT.

CM #: CO-83-2033

STATUS: PROBLEM ON HOLD

DESCRIPTION:

TRAFFIC ONLY COMES UP ON THE SVC QUEUE FOR RELEASE AUTHORIZATION IF IT IS DESTINED FOR AN AUTODIN CIRCUIT. SOMETIMES, WE NEED THE CAPABILITY TO MONITOR ALL TRAFFIC COMING FROM ON OF OUR BACKSIDE PROCESSORS TO THE OTHER. ALSO, WE NEED TO REVIEW TRAFFIC COMING FROM A TAPE THAT HAS BEEN READ IN. IF IT IS DESTINED FOR A MODE II TRIBUTARY. RELEASE AUTHORIZATION FOR LINES OTHER THAN DIN WOULD ALLOW US TO MONITOR TRAFFIC FOR ANY LINE ON AN AS NEEDED BASIS.

CM #: CO-83-2034

STATUS: PROBLEM ON HOLD

DESCRIPTION:

WHEN MESSAGE TRAFFIC IS PRINTED AND HAND DELIVERED TO A CUSTOMER, AN LML MUST BE TAKEN TO COUNT THE NUMBER OF MSGS DELIVERED. ERRORS MAY BE MADE IN COUNTING AND THIS PROCESS MAY TAKE QUITE SOME TIME IF THE LIST IS LONG. THERE ARE OFTEN SEVERAL PAGES OF THE LML LIST AND IF AN ACCURATE COUNT WERE PRINTED ON THE DEC WRITER, THIS TROUBLE COULD BE AVOIDED.

Communications Configuration

The CSP at USAFE is dual-homed to AUTODIN via Pirmasens and Croughton ASCs. There are two backside processors configured at USAFE. There is a direct link to the MAXI system for analyst support as well as a link to the COIC host processor. There are currently no remote communications lines configured at this site.

A connectivity diagram for USAFE is presented in Figure A-08.

Current Operations Statistics

USAFE's average traffic volume and CIM rate are as follows:

- o Messages transmitted - 400 per month
- o Messages received - 33,000 per month
- o CIM rate - not reported

With USAFE's current traffic volume and message file size, the average on-line message storage capacity is approximately 30 days. Virtually all of the incoming traffic is routed automatically via derivative routing indicator to the MAXI system.

The average reliability of the CSP software at USAFE is 99.7%. This figure only includes outages attributed to software.

Future Operation

A MAXI system, which has been connected from the OSC as a GENSER-only backside tributary, will be reconnected to the OSC CSP in February, 1984.

Site Personnel

The CSP on-site representative at USAFE is Mr. Raymond Murphy, PRC. His daily operations require direct interface with the HQ USAFE intelligence and communications staffs.

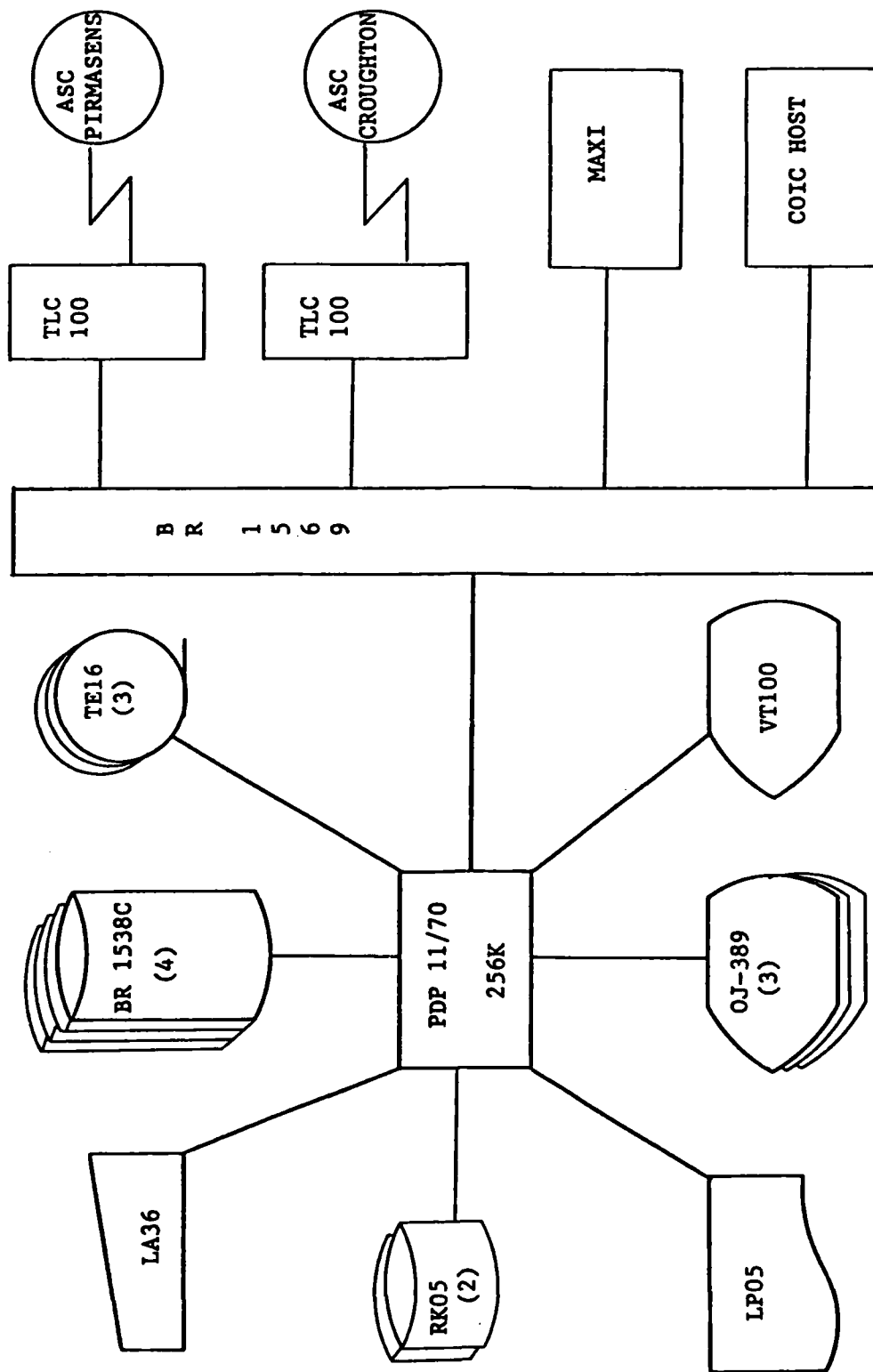


Figure A-08 USAFE Connectivity Diagram

LANTCOM, Norfolk, Virginia

Site Location

CSP was installed at CINCLANTFLT, Norfolk, Virginia in October, 1981 and is being operated by U.S. Navy data processing personnel.

CSP's primary mission is to provide continuous message handling support for CINCLANTFLT's Consolidated Intelligence Communication Center (CICC). In addition to processing messages destined for CINCLANTFLT, the CICC guards for all major and most subordinate commands within the immediate area. Numerous ships and embarked staffs require message support depending upon ship movements.

Equipment Configuration

The CSP at LANTCOM is currently implemented on the following hardware for the primary system:

- o CPU - One (1) PDP-11/70 with 320K memory
- o System Console - One (1) LA36 DECwriter
- o Disk drives - Two (2) BR1538C (shared)
Three (3) BR1538D (shared)
- o Tape drives - Two (2) TE16
- o Multiplexer - One (1) BR1569 (shared)
One (1) SMC200
One (1) T-16
- o Line printers - Two (2) MOD-40 printers (shared)
One (1) LP11RA (shared)
- o AUTODIN Interface Device - Two (2) Inteq 1A-5100 (shared)
- o Message Distribution Console - Three (3) OJ-389 (shared)
- o Other Equipment - One (1) VT100 terminal
One (1) CompuScan COMET OCR (shared)
One (1) AN/FGT-7 paper tape reader
(shared)
Two (2) AN/FGR-10 paper tape punch
(shared)
Two (2) MOD-40 remote printers (shared)

The backup system is configured almost identically to the primary. Those items listed as "shared" above are switchable between the two processors. Otherwise, the backup system has one PDP-11/70 with 384K memory, one LA36, and two TEL6 tape drives. This processor also has two RK05 disk drives.

Software Configuration

Figure A-09 contains a site report extracted from Informatics Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation and a status of pending releases. Also included are any site-unique modules developed for this particular site.

Communications Configuration

The LANTCOM CSP is dual-homed with links to Andrews and Ft. Detrick ASCs. There are two ZICON circuits, one transmit/receive and one receive only. Other remote communications lines consist of two MOD-40 printers located at LEC and FOSIC.

The backside computer interface at LANTCOM is configured as an MSS line which terminates in the CAMHS PDP-11/70 processor. This link is transmit only.

A connectivity diagram for LANTCOM is presented in Figure A-10.

Current Operations Statistics

LANTCOM's average traffic volume and CIM rate are as follows:

- o Messages transmitted - 2,475 per month
- o Messages received - 45,000 per month
- o Line blocks transmitted - 52,700 per month
- o Line blocks received - 1,100,000 per month
- o CIM rate - .81%

Even with the high volume processed by LANTCOM, the CSP is able to maintain approximately 35 days of online storage. A low CIM rate has been maintained as a result of the extensive format and security checks performed by CSP.

SITE: CINCLANT J-2 (LA)

RELEASE: 2.2C2

STATUS: OPERATIONAL 01-AUG-83

DATE OF INSTALLATION: 01-AUG-83

REMARKS: AWAITING PATCH TAPE FOR 2.3B TLCCON FIXES BEFORE 2.3 IS PLACED
ON LINE.

UNIQUE MODULES:

NONE

OUTSTANDING PROBLEM REPORT:

CM #: LA-82-0005

STATUS: ENHANCEMENT

DESCRIPTION:

INTERFACE OSIS BASELINE TO PROVIDE LOCAL ACCOUNTABILITY AND OPTIMIZE
ON-LINE DELIVERY OF SI/SCI MESSAGES. CSP HAS THE CAPABILITY TO UTILIZE
THE SSR GATEWAY AS AN ADDITIONAL SEND-RECEIVE BACKSIDE. THIS WOULD ENHANCE
CURRENT MEANS OF TRANSMITTING MESSAGES TO OSIS.
AWAITING REQUIREMENTS DEFINITION AND IMPACT ON CSP.

CM #: LA-83-2003

STATUS: ENHANCEMENT

DESCRIPTION:

PRESENT ON-LINE SYSTEM AUDIT TRAIL CAPABILITY (PAD READOUT) IS DISK
(MSGFIL) DEPENDENT, AND LIMITED TO DISPOSITION OF ORIGINAL DAN/MLN AND
THE ASSOCIATED TRANSACTION RECORD. SUBSEQUENT MESSAGE REENTRY UNDER A
NEW DAN/M'N REQUIRES ADDITIONAL OPERATOR INITIATED 'PAD READOUT' TO
DETERMINE THE ULTIMATE DISPOSITION OF THE MESSAGE.

THIS PROBLEM REQUIRES RESTRUCTURE OF THE PAD, HENCE A NEW RELEASE WOULD
BE REQUIRED. THIS SHOULD BE SUBMITTED TO THE CCB FOR EVALUATION.

THIS ENHANCEMENT IS PUT ON HOLD PENDING REPERCUSSIONS OF INSTALLATION
OF DUAL-DISK RECORDING.

CM #: LA-83-2005

STATUS: ENHANCEMENT

DESCRIPTION:

SUGGEST 'ON-CALL' CAPABILITY TO RECONFIGURE SITTE SOFTWARE TO QUEUE
SPECIFIED ROUTING INDICATORS TO A UNIQUE SOFTWARE QUEUE AND DIRECT
THIS QUEUE (INDEPENDENT OF ANY OTHER CSP QUEUE) TO A DESIGNATED

SU-1652 FOR WATCH OFFICER SCREENING. THIS SU-1652 DISPLAY TERMINAL SHOULD BE LIMITED TO PERFORM THE FOLLOWING EVOLUTIONS:

- A. 'VFK RELEASE' AND SYSGEN OF A LINE 1 PILOT CONTAINING A UNIQUE RI
 - B. DIVERT SELECTED MESSAGES TO A SPECIAL QUEUE
 - C. PROVIDE A PRINTED COPY OF ALL MESSAGES REVIEWED
- THIS ENHANCEMENT IS A SITE UNIQUE REQUIREMENT. EVALUATION HAS BEGUN FOR USING A VFK FOR THIS CAPABILITY.

CM #: LA-83-2006
STATUS: ENHANCEMENT

DESCRIPTION:

REQUEST THAT AN INTERFACE, COMMON TO OTHER SYSTEMS SUCH AS PDSC AND MAXI BE INCLUDED IN THE CSP BASELINE IN EARLY FY84.

THIS ENHANCEMENT IS AWAITING INFORMATICS EVALUATION.

CM #: LA-83-2008
STATUS: PROBLEM ON HOLD

DESCRIPTION:

CRIITC MODE II GATEWAY TERMINATION (E.G. I/O ERROR TIMEOUTS) ARE IDENTIFIED/WRITTEN ON A DECWRITER LOCATED IN AN ADJOINING COC THAT MAINTAINS OPERATIONAL MAINTENANCE RESPONSIBILITY FOR CSP AND FOUR OTHER MAJOR SYSTEMS UNDER CINCLANT CONTROL. CONSEQUENTLY, ADP PERSONNEL THAT STAFF THE COC CANNOT DEVOTE THEIR COMPLETE ATTENTION TO CSP OPERATIONS AND TIMELY RESPONSE TO GATEWAY TERMINATION DOES NOT ALWAYS OCCUR. VT-100 IS AN INADEQUATE SUBSTITUTE FOR HARDCOPY, SEQUENTIAL PRINTOUT PROVIDED BY THE SYSTEM DECWRITER AND DOES NOT ALWAYS REFLECT A "TRUE" SYSTEM STATUS (E.G. LINE TIMEOUTS AND OTHER IRREGULARITIES) NEEDED BY THE COMMUNICATIONS PERSONNEL.

CM #: LA-83-2011
STATUS: ENHANCEMENT

DESCRIPTION:

THIS IS AN ENHANCEMENT TO ALLOW THE FIXED DISTRIBUTION KEYS TO ALLOW FOR PRECISE DISSEMINATION (I.E. ACTION ADDEES AND INFO ADDEES). THE FD VFKS CURRENTLY PLACE ALL ADDEES IN THE INFO FIELD AND HAS LIMITED LANTCOM'S USE AS A RESULT OF THE HIGHLY DIVERSE INTERNAL CINCLANT/CINCLANTFLT STAFF AND THE INTRA-COMMAND MESSAGE ROUTING REQUIREMENTS.

CM #: LA-83-2012
STATUS: ENHANCEMENT

DESCRIPTION:

THIS ENHANCEMENT WOULD EXPAND THE ALLOWABLE NUMBER OF ENTRIES IN THE FARM TABLE (160) AND THE OSUPDT TABLE (140) TO 280 ENTRIES FOR EACH TABLE.

CM #: LA-83-2013

STATUS: ENHANCEMENT

DESCRIPTION:

THIS ENHANCEMENT WOULD ARRANGE LML REPORTS BY DATE-TIME-GROUP [DTG] ORDER. THE LML IS CURRENTLY IN THE TIME OF RECEIPT (TOR) ORDER WHICH IS RARELY USED TO IDENTIFY MESSAGES. THE MOST USED IDENTIFIER OR REFERENCE IS THE ORIGINATOR AND DATE-TIME-GROUP. A DTG ARRANGED LML REPORT WOULD BE MORE LOGICAL AND ELIMINATE EXCESSIVE MAN HOURS IN RESEARCHING THE CURRENT LML REPORT.

ECD: 30-JAN-84

CM #: LA-83-2015

STATUS: PROBLEM ON HOLD

DESCRIPTION:

AN ERROR [U0002 QHAND INV PRB] OCCURS DURING RESTART SEQUENCE. OTHER THAN ERROR AND LOSS OF RECALL CAPABILITY, SYSTEM REACTS NORMALLY. LIMITED RESEARCH HAS BEEN DONE TO DETERMINE THE TOTAL EFFECT ON THE SYSTEM.

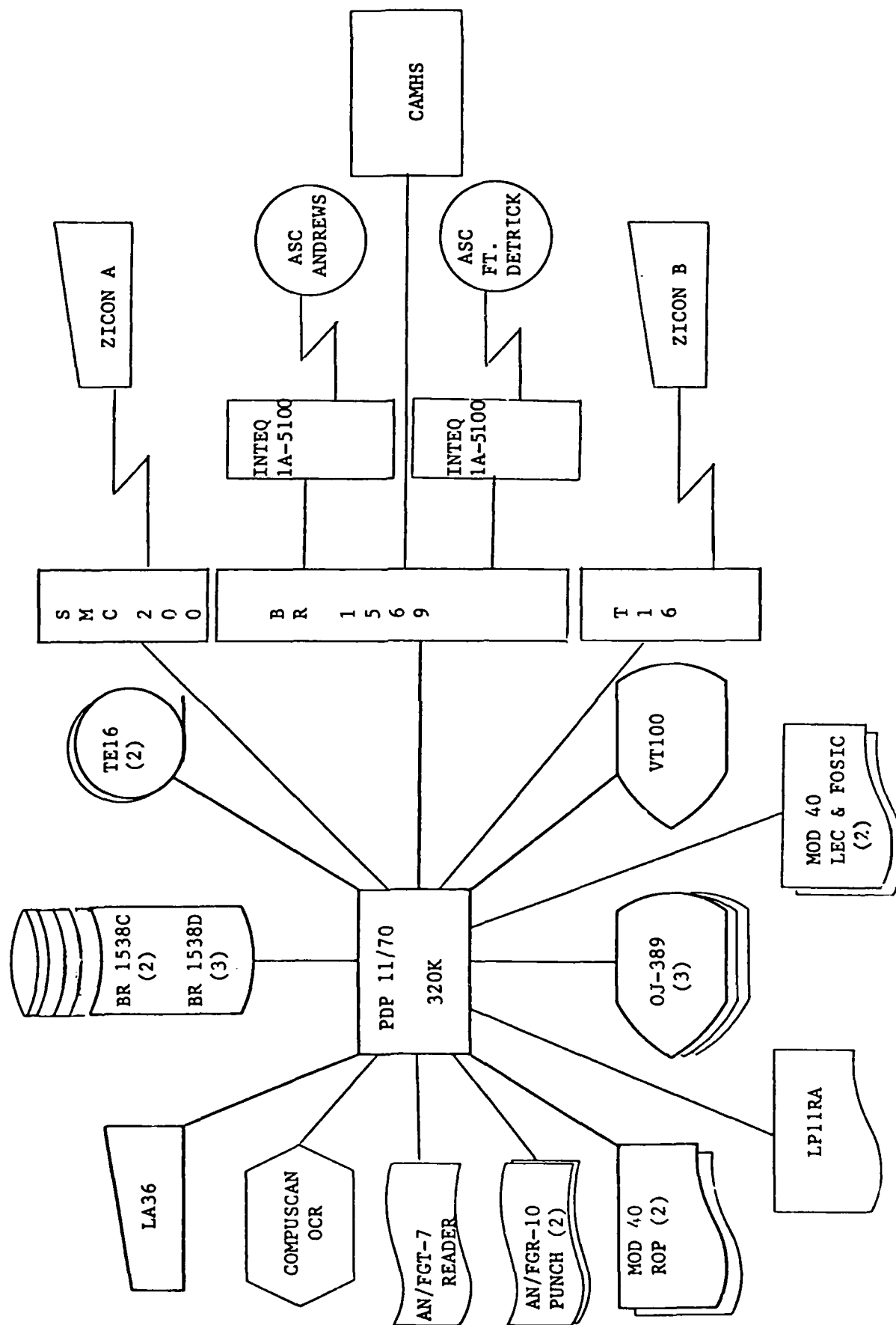


Figure A-10 LANTCOM Connectivity Diagram

All incoming messages are received and routed by MDC operators; none are automatically or derivatively routed.

The station reliability for LANTCOM including both hardware and software outages is approximately 99.5%.

Future Operations

There are plans to implement a transmit/receive interface to the OSIS baseline SUBLANT, and upgrade the CAMHS interface to full duplex. The software will have to be reconfigured to add the additional lines and queues as necessary to support these changes. When this occurs, there will be somewhat of an increase in the traffic load on the CSP.

With the implementation of CSP Release 2.3, LANTCOM plans to convert to a dumb optical character reader and use the PLA capabilities of the CSP.

Site Personnel

The CUBIC/CSP on-site representative at LANTCOM is Mr. John Strama, Informatics. Mr. Strama works closely with both the data processing and communications staffs of CINCLANTFLT in his daily operations. His primary point of contact is CINCLANTFLT-J291.

FTD, Wright-Patterson AFB, Ohio

Site Location

CSP was installed at the Foreign Technology Division (FTD), Wright-Patterson AFB, Ohio in June, 1982.

FTD produces scientific and technical intelligence (S&TI) to provide current foreign aerospace technical threat assessments for use in AFSC systems planning an acquisition. In addition, FTD is responsible for providing foreign aerospace technological data and data analysis support to HQ USAF, major commands, NASA, agencies of the national intelligence community and R&D support.

CSP supports this mission by providing real time transmission and reception of AUTODIN message communications.

Equipment Configuration

The CSP is currently implemented on the following equipment:

- o CPU - One (1) PDP-11/70 with 192K memory
- o System Console - One (1) LA36 DECwriter
- o Disk Drives - Two (2) BR1538C
- o Tape Drives - Three (3) TU16 drives
- o Multiplexer - One (1) 32 channel BR1569
- o Line Printers - Two (2) Dataproducts 2267, 600 lpm
One (1) Dataproducts 2470, 1200 lpm
- o AUTODIN Interface Device - One (1) TLC100
- o Message Distribution Console - Two (2) OJ-389
- o Other Equipment - Two (2) ASR-28 paper tape readers
One (1) CR-11 card Reader
Two (2) VT-52 terminals

All of the above equipment is configured as one operational CSP. There is no second processor or set of peripherals to be used as a backup. The current backup will be provided manually through a DSTE.

Software Configuration

Figure A-11 contains a site report extracted from Informatics Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation and a status of pending releases. Also included are any site-unique modules developed for this particular site.

Communications Configuration

The CSP is currently connected to the ASC at Gentile for online operations with the Andrews ASC permanently altrouted to the same line. In the event of a circuit outage, the Andrews line will be activated on the DSTE.

There are no other local tributaries configured as direct electrical links at this time. There are, however, five organizations with computer systems which are serviced with a magnetic tape interface. A connectivity diagram is illustrated in Figure A-12.

Current Operations Statistics

FTD's average traffic volume and CIM rate are as follows:

- o Messages transmitted - 1,825 per month
- o Messages received - 25,000 per month
- o Line blocks transmitted - 40,000 per month
- o Line blocks received - 900,000 per month
- o CIM rate - 1.45%

Given this traffic volume and the capacity of the message file, it is anticipated that the online message storage capacity will be approximately 35 days.

Since there are no automated backside processors, no messages are derivatively routed and all messages are manually received by the MDC operators. The MDC clerk determines routing for all incoming messages and places each message on selected output queues for either hardcopy or mag-tape distribution. Mag-tape messages are altrouted to the intercept tape during normal operation of CSP. Once daily, these messages are placed on their respective mag-tapes and hand-carried to the responsible organizations.

SITE: FTD (FT)

RELEASE: 2.2C2

STATUS: OPERATIONAL

01-SEP-82

DATE OF INSTALLATION:

11-MAR-83

REMARKS: RELEASE 2.3 WAS INSTALLED AND IS AWAITING OPERATIONAL IMPLEMENTATION
PENDING CIRCUIT RECONFIGURATION BY THE ASC

UNIQUE MODULES:

MODULES: MD2CON.MAC

IDENT: V22FT1

DESCRIPTION:

ENABLES PAPER TAPE READER

OUTSTANDING PROBLEM REPORT:

NONE

Figure A-11 FTD Configuration Status

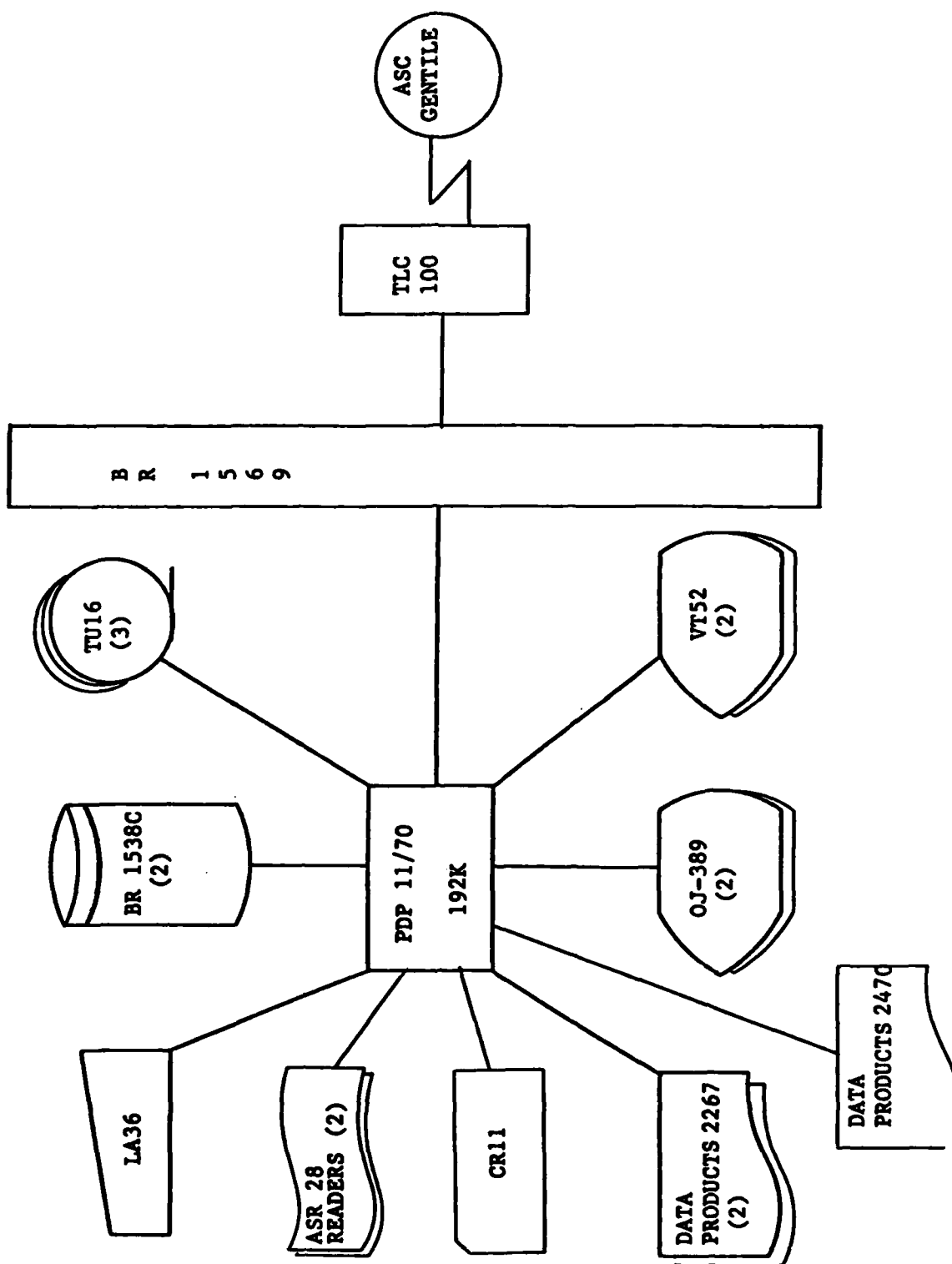


Figure A-12 FTD Connectivity Diagram

Future Operations

There are plans to procure one more OJ-389 and an additional TLC100. Also, at some point in the future the BR1538C disk drives will be upgraded to BR1538D drives, increasing the capacity to 300 MB each.

The problem with no CSP backup will be alleviated by the procurement of an additional PDP-11/70 system as soon as it is available.

Site Personnel

There are currently no contractor personnel on-site at FTD. All on-site maintenance is provided by FTD personnel for identification of problems and routine table maintenance. Problems will be resolved by the centralized development staff in Bellevue and solutions will be communicated to FTD personnel for implementation.

ADCOM, Colorado Springs, Colorado

Site Locations

CSP was installed at HQ Air Defense Command, Cheyenne Mountain Complex, Colorado Springs, Colorado in August, 1982, and was placed online in October, 1982.

The NORAD/ADCOM community provides surveillance, detection and early warning for the North American continent and its perimeters. The CSP will support this mission by providing real-time transmission and reception of AUTODIN message communications.

Equipment Configuration

The CSP is currently implemented on the following hardware for the primary system:

- o CPU - One (1) PDP-11/70 with 256K memory
- o System Console - One (1) LA120 DECwriter
- o Disk Drives - Three (3) BR1538D (shared)
One (1) RL01
- o Tape Drives - Two (2) TE16 (shared)
One (1) TE16
- o Multiplexer - One (1) BR1731
- o Line printers - One (1) LP11VA (shared)
One (1) LP11VA
- o AUTODIN Interface Device - Two (2) TLC100 (shared)
- o Message Distribution Console - Three (3) OJ-389 (shared)
- o Other Equipment - One (1) PC11 Paper Tape Reader/Punch (shared)
One (1) CR11 Card Reader (shared)
One (1) VT100 terminal

The backup system is configured exactly the same as the primary system, so full redundancy is provided. Those items listed as shared are switchable between the two processors through a DT07 unibus switch.

Software Configuration

Figure A-13 contains a site report extracted from Informatics Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation and a status of pending releases. Also included are any site-unique modules developed for this particular site.

Communications Configuration

ADCOM's CSP has links to two ASCs, McClellan and Tinker. In addition, there is a link to the NCMC command post which is configured as a Mode II circuit.

A connectivity diagram is presented in Figure A-14.

Current Operations Statistics

ADCOM's average traffic volume and CIM rate are as follows:

- o Messages transmitted ~ 1,800 per month
- o Messages received - 35,000 per month
- o CIM rate - 1.30% average

Given this traffic volume and the capacity of the message file, it is anticipated that the on-line message storage capacity will be approximately 40 days.

Future Operations

There are no known changes to the planned hardware configuration at ADCOM. However, as soon as CSP Release 3.0 is implemented, ADCOM plans to use the remote OJ-389 dissemination capability. The actual mode of operation, however, is unknown at this time.

Site Personnel

The CUBIC/CSP on-site representative at ADCOM is Mr. Dale Pease, Informatics. He interfaces on a daily basis with the ADCOM communications staff.

SITE: ADCOM (AD)

RELEASE: 2.3A

STATUS: OPERATIONAL 02-AUG-83

DATE OF INSTALLATION: 25-JUL-83

REMARKS: NONE

UNIQUE MODULES:

NONE

OUTSTANDING PROBLEM REPORT:

CM #: AD-82-0001

STATUS: ENHANCEMENT

DESCRIPTION:

REQUEST GATEWAY/SOFTWARE BE DEVELOPED FOR THE FOLLOWING CARD PUNCH:

A) MANUFACTURER: DECISION DATE

B) MODEL: 8010-80 CARD PROCESSOR

C) OPTIONS: WITH BINARY CAPABILITIES

THIS ENHANCEMENT IS AWAITING REQUIREMENTS DEFINITION.

CM #: AD-83-2004

STATUS: PROBLEM ON HOLD

DESCRIPTION:

MESSAGES NOT RECOGNIZING ALL AIGS. MESSAGES RECEIVED WITH FOUR AIGS IN FORMAT LINES SEVEN AND/OR EIGHT. FARM DROPPED THE SECOND AND ROUTED THE THIRD AIG. THE FIRST AND FOURTH WERE NOT IN THE DATA BASE.

CM #: AD-83-2007

STATUS: PROBLEM ON HOLD

DESCRIPTION:

ALROUTED MSGS RECEIVED FROM ANOTHER STATION ARE ROUTED TO THE 'CAR' QUEUE. WHEN THE STATION IS RETURNED TO SERVICE, THE 'CAR' QUEUE IS ALROUTED TO THE DIN (AUTODIN) QUEUE. IF THE ORIGINAL ALROUTED MESSAGE HAD AN LMF OF (CT), THE ASC WILL GIVE AN INVALID HEADER REJECT BECAUSE THERE IS NO CARD COUNT IN THE REINTRODUCED MESSAGE.

CM #: AD-83-2008

STATUS: PROBLEM ON HOLD

DESCRIPTION:

MSG ROUTING INDICATORS PRESCRIBED IN ACP 117 ARE NOT ABLE TO BE ENTERED INTO THE PLARI BY CLASSIFICATION; I.E. 'UNCLAS' OR 'CLASSIFIED' AS TO WHAT THE DISTANT END CAN RECEIVE. AT PRESENT, ONLY CLASSIFIED ROUTING INDICATORS ARE ENTERED IN THE FILE. BY INSERTING 'UNCLAS' R/I'S INTO THE PLARI, THE CHANCE OF SENDING THE WRONG R/I IS MAGNIFIED.

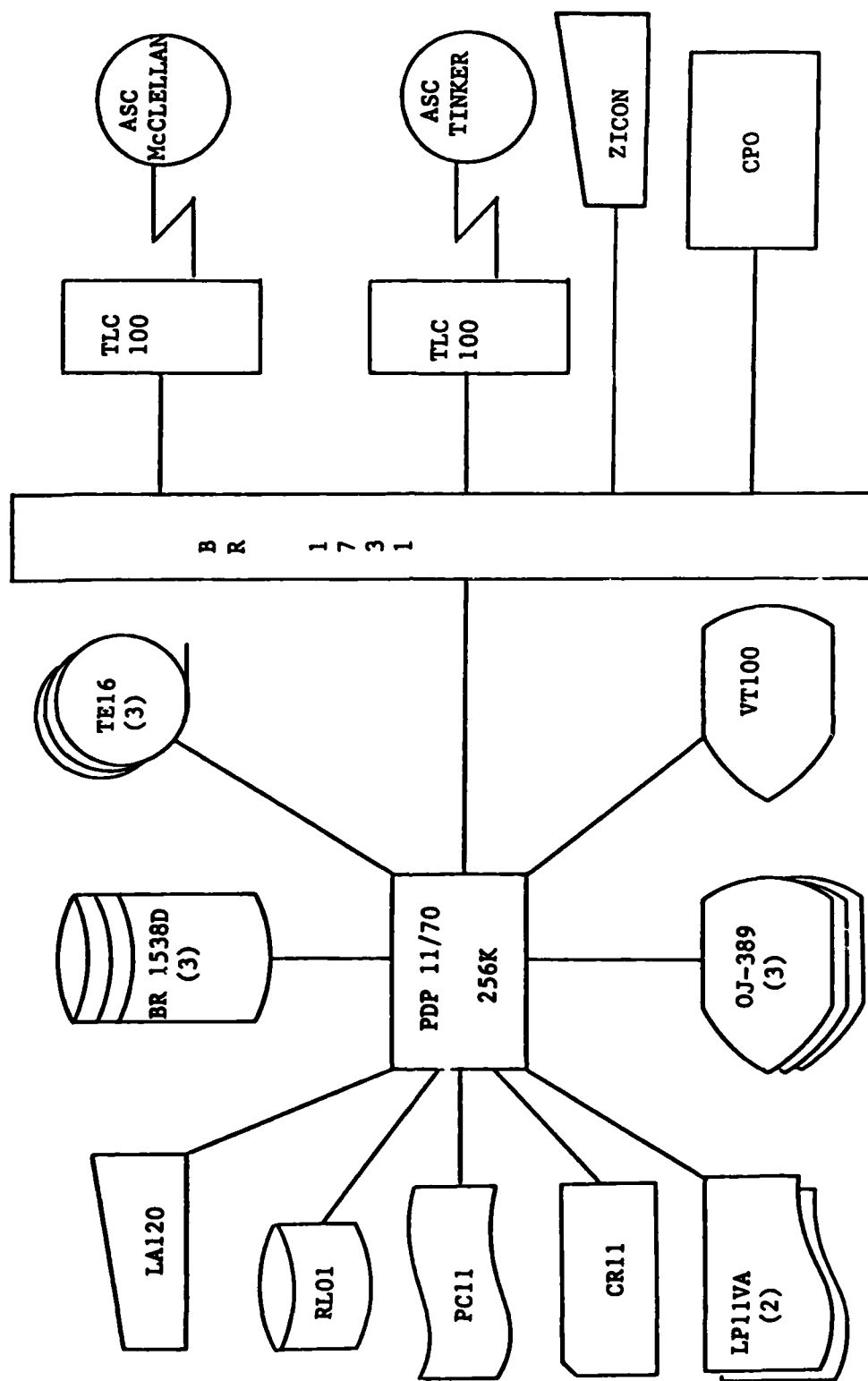


Figure A-14 ADCOM Connectivity Diagram

HQ CINCPAC, Camp H.M. Smith, Hawaii

Site Location

CSP was installed at HQ Commander-in-chief Pacific in July 1979. This installation was reaccredited by DIA and DCA in July 1982. The occasion for this reaccreditation was the implementation of the Fully Automated Routing of Messages (FARM) software package developed by the CSP programmer assigned to CINCPAC. This software package will be included in the CUBIC/CSP baseline, and will be distributed to CSP users as their systems are updated with the current baseline.

The Pacific Command (PACOM) area consists of approximately 96 million square miles and contains two-thirds of the world's population. The type, level and degree of threat to U.S. national interest ranges from the strategic nuclear forces of the Soviet Union to the guerrilla/insurgency threat in the Southern and Southeast Asian areas. The mission of the Commander-in-chief, Pacific (CINCPAC), is "To maintain the security of PACOM and defend the United States against attack through the Pacific Ocean; to support and advance the national policies and interests of the United States and discharge U.S. military responsibilities in the Pacific, Far East, Southeast and South Asia; to prepare plans, conduct operations and coordinate activities of the forces of the PACOM in consonance with directives of higher authority."

CSP provides DSSCS Communications Support for transmission and reception of real-time AUTODIN messages in support of CINCPAC's mission. In addition, the CSP functions as a front-end processor for the PACOM Data Systems Center (PDSC) system, which directly support CINCPAC's intelligence analysts. The PDSC computer system is a derivative of the MAXI system.

Equipment Configuration

The CSP at CINCPAC is currently implemented on the following hardware for the primary system:

- o CPU - One (1) PDP-11/70 with 256K memory
- o System console - One (1) LA36 DECwriter
- o Disk drives - Three (3) BR1538D (shared)
- o Tape drives - Two (2) TE10
Three (3) TU45 (shared)

- o Multiplexer - One (1) 36 channel BR1569
- o Line printers - One (1) LP11 RA (shared)
Two (2) TT Model 4010 (shared)
One (1) TT Model 4030 (shared)
- o AUTODIN interface device - Two (2) INTEQ (shared)
- o Message distribution console - Three (3) OJ-389 (shared)
- o Other equipment - One (1) VT52 Terminal (shared)
Four (4) Paper Tape Reader/Punch (shared)
One (1) Card Reader (shared)
One (1) Unibus-Unibus link
One (1) OCR (shared)

The backup system is configured identically to the primary. Those items listed as "shared" above are switchable between the two processors. Additionally, individual circuits terminating in the BR1569 multiplexer are switchable between both processors.

Software Configuration

Figure A-15 contains a site report extracted from Informatics Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation, and a status of pending releases. Also included are any site unique modules developed for this particular site.

Communications Configuration

The CSP is dual-homed to McCellan and Wahiawa ASCs for online tributary operations, DSSCS only. The only backside tributary at CINCPAC is the PDSC system, a derivative of the MAXI system.

A connectivity diagram for CINCPAC is presented in Figure A-16.

Current Operations Statistics

- o Messages transmitted - 1,500 per month
- o Messages received - 53,600 per month

SITE: CINCPAC (PD)

RELEASE: 2.3A

STATUS: OPERATIONAL 06-SEP-83

DATE OF INSTALLATION: 22-AUG-83

REMARKS: NONE

UNIQUE MODULES:

MODULES: AUTCON.MAC

IDENT: V23PD1

DESCRIPTION:

SITE UNIQUE MODULE TO REPLACE TLCCON AS THE AUTODIN GATEWAY. THIS IS REQUIRED TO INTERFACE THE INTEQ DEVICE.

MODULES: COMMLC.MAC

IDENT: V23PD1

DESCRIPTION:

MODIFIED TO ALLOW THE DCT AND PDSC LINES TO BE TURNED ON AND OFF.

MODULES: CSPSKD.MAC

IDENT: V23PD1

DESCRIPTION:

MODIFIED TO ALLOW TIME SET BY SITE FOR RUN TIME PLS

MODULES: DCTRDR.MAC

IDENT: V23PD1

DESCRIPTION:

SITE UNIQUE MODULE TO READ MESSAGES FROM A GENSER ONLY DCT 2000 AND PLACE THEM INTO A FILES-11 FILE FOR DIRECT TRANSFER TO PDSC.

MODULES: DCTREF.MAC

IDENT: V23PD1

DESCRIPTION:

SITE UNIQUE MODULE TO REFORMAT MESSAGES FROM THE DCT LINE FOR TRANSMISSION TO PDSC.

MODULES: DMC .MAC

IDENT: V23PD1

DESCRIPTION:

SITE UNIQUE MODULE TO ALLOW AN OPERATOR COMMAND TO CONTROL THE TRANSFER OF ANY FILE TO PDSC.

MODULES: DMCDRV.MAC

IDENT: V23PD1

DESCRIPTION:

SITE UNIQUE MODULE TO SCAN THE DISK FOR ANY FILES TO BE TRANSFERRED TO PDSC.
THIS TASK NOTIFIES DMCPTY TO START THE TRANSFER.

MODULES: DMCPTY.MAC

IDENT: V23PD1

DESCRIPTION:

SITE UNIQUE GATEWAY TO PULL MESSAGES FROM A FILES-11 FILE TO TRANSFER TO
THE PDSC SYSTEM. THIS GATEWAY USES THE UNIVAC TERMINAL PROTOCOL ON THE
BR1569.

MODULES: DSPV52.MAC

IDENT: V23PD1

DESCRIPTION:

BASELINE MODIFICATION TO DISPLAY THE STATUS OF THE DCT RECEIVE LINE, AND
REFORMATTER; AND THE DMC DRIVER AND GATEWAY TO PDSC.

MODULES: INTGEN.MAC

IDENT: V23PD1

DESCRIPTION:

MODIFIED TO DISPLAY PDSC CIRCUIT STATUS

MODULES: MSMSN .MAC

IDENT: V23PD1

DESCRIPTION:

PDSC UNIQUE ERROR MESSAGE FILE.

MODULES: MSSGWY.MAC

IDENT: V23PD1

DESCRIPTION:

SITE UNIQUE GATEWAY TO PLACE MESSAGES INTO A FILES-11 FILE FOR USE BY THE
DMCPTY SOFTWARE.

MODULES: DEEGWY.MAC

IDENT: V23PD1

DESCRIPTION:

SITE UNIQUE GATEWAY TO PLACE MESSAGES INTO A FILES-11 FILE FOR USE BY
THE DMCPTY SOFTWARE.

MODULES: QHAND .MAC

IDENT: V23PD1

DESCRIPTION:

MODIFIED FOR AUTCON CRITIC HANDLING

MODULES: RDPGWY.MAC

IDENT: V23PD1

DESCRIPTION:

MODIFIED TO PRINT AN ADDITIONAL LINE AT THE TOP OF EVERY MESSAGE
CONSISTING OF 'SWO' AND 'DISTR0'.

MODULES: TA .MAC

IDENT: V22PD1

DESCRIPTION:

SITE UNIQUE HANDLER TO DRIVE THE MOD 40 PRINTERS THROUGH THE BR1569
ASCII ROM.

OUTSTANDING PROBLEM REPORT:

CM #: PD-83-2002

STATUS: UNDER ANALYSIS

DESCRIPTION:

WHEN AN OUTGOING MSG IS GENERATED IN OTHER THAN DD-173 FORMAT (I.E
MESSAGE RECAL FOR READDRESSABLE FOR SYSTEM INPUT, THE OASN MUST BE
INSERTED MANUALLY BE THE OPERATOR. IF THE OPERATOR USES THE NEXT
AVAILABLE OASN, THAT OASN WILL BE DUPLICATED ON THE MESSAGE PROCESSED
BY PLA.

ECD: 1-NOV-83

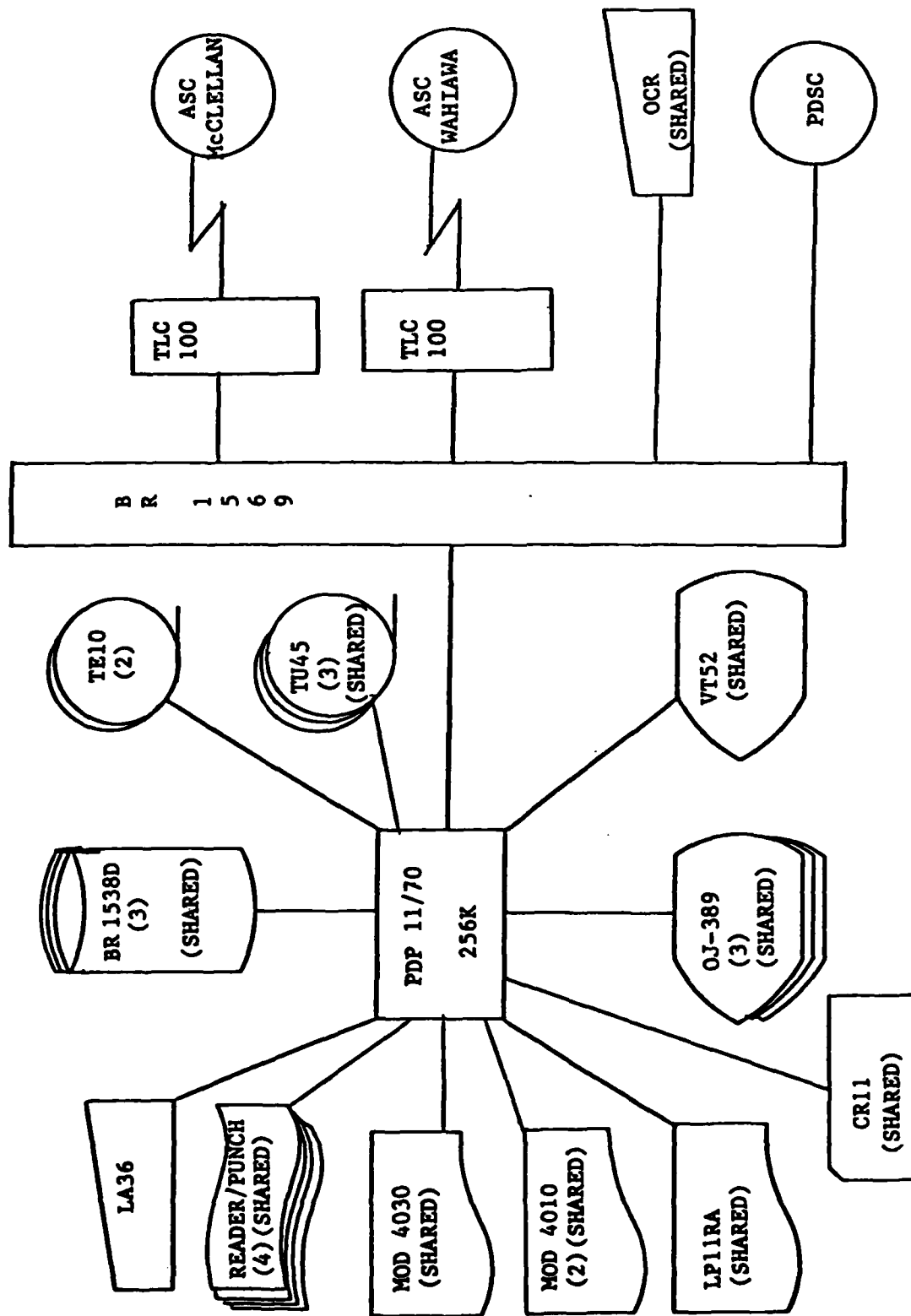


Figure A-16 CINCPAC Connectivity Diagram

o CIM Rate - 2%

The CSP is able to maintain approximately 60 days of online storage. CINCPAC has been able to maintain a low CIM rate due to the extensive format and security checks performed by the CSP.

Approximately 75% of the incoming messages are derivatively routed to PDSC. Of the remainder, 95% are automatically routed by the FARM software. The Message Distribution Clerk routes the rest.

The reliability for CINCPAC including both hardware and software outages is approximately 99%.

Future Operations

The existing software between the CSP and PDSC was written and installed by non-Informatics contractor personnel. This software will be redesigned by Informatics personnel, reinstalled and reaccredited. This will be accomplished on an interim basis to be followed by a standard baseline gateway in the future.

Site Personnel

There are no CUBIC/CSP on-site representatives at CINCPAC. Informatics facility at Bellevue coordinates with other contractor personnel and the communications staff of CINCPAC to resolve system problems.

REDCOM, MacDill AFB Florida

Site Location

CSP was installed at REDCOM, MacDill AFB, Florida in September, 1982 and supports both USREDCOM and USCENTCOM activities.

CSP's primary mission is to provide continuous message handling support for both USREDCOM and USCENTCOM personnel. These agencies both have a mission of rapid deployment to support contingencies. Major exercises are conducted and supported by the two major commands using the CSP. The CSP hardware itself is operated by USREDCOM personnel.

Equipment Configuration

The CSP at REDCOM is currently implemented on the following hardware for the primary system:

- o CPU - One (1) PDP-11/70 with 512K memory
- o System Console - One (1) LA36 DECwriter
- o Disk drives - Two (2) BR1538D (shared)
Two (2) RL02 (shared)
- o Tape drives - Three (3) TE16
- o Multiplexer - One (1) BR1731
- o Line Printer(s) - One (1) LP11 (shared)
- o AUTODIN Interface Device - Two (2) TLC100 (shared)
- o Message Distribution Console - Two (2) OJ-389 (shared)
- o Other Equipment - One (1) VT100 terminal
One (1) MOD-40 remote printer (shared)

The backup system is configured almost identically to the primary. Those items listed as "shared" above are switchable between the two processor.

Software Configuration

Figure A-17 contains a site report extracted from Informatics Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation and a status of pending releases. Also included are any site-unique modules developed for this particular site.

SITE: REDCOM (RE)

RELEASE: 2.3A

STATUS: OPERATIONAL 15-AUG-83

DATE OF INSTALLATION: 17-SEP-82

REMARKS: NONE

UNIQUE MODULES:

MODULES: NSACON.MAC

IDENT: V22RE1

DESCRIPTION:

THIS IS A COPY OF MD2CON TO SUPPORT A ZICON CIRCUIT TO NSA.

MODULES: RDFCON.MAC

IDENT: V22RE1

DESCRIPTION:

THIS IS A COPY OF MD2CON TO SUPPORT A MODE II CIRCUIT AT RDJTF

OUTSTANDING PROBLEM REPORT:

CM #: RE-83-2029

STATUS: ENHANCEMENT

DESCRIPTION:

LML LISTING FOR RECEIVE LINE DOESN'T EXIST.

ECD: NOT ESTABLISHED

CM #: RE-83-2033

STATUS: UNDER ANALYSIS

DESCRIPTION:

A MSG WAS GENERATED FOR BOTH THE AUTODIN AND FARM QUEUES. THE MSG APPEARED TO GO TO BOTH QUEUES BUT WAS ACTUALLY REJECTED BY THE ASC PROBABLY FROM THE TLC. THE MSG ON THE OPERATOR'S CONSOLE ONLY STATES "I004 — TTINK - MSG RM 5Y ASC". THIS ERROR WAS WRITTEN TO THE REF RECORD AND THE MSG WAS RETURNED TO THE SERVICE QUEUE. THE IMAGE THAT WAS THEN PUT ON THE FARM QUEUE WAS ALSO REJECTED BECAUSE FARM WAS UNABLE TO DETERMINE THE ROUTING OF THE MSG. SINCE THIS MSG WAS ALSO WRITTEN IN THE REF RECORD, THE SERVICE CLERK HAD NO INDICATION THAT THE MSG WAS REJECTED BY THE ASC, CAUSING AN EXTENSIVE DELAY.

ECD: 2-1-83

Figure A-17 REDCOM Configuration Status

Communications Configuration

The REDCOM CSP is dual-homed with links to Albany and Tinker ASCs. There is a ZICON circuit, both transmit and receive. Another remote communications line consists of an OJ-389 message distribution terminal in the CENTCOM communications center.

The backside computer interface at REDCOM is a MAXI system for analyst support.

A connectivity diagram for REDCOM is presented in Figure A-18.

Current Operations Statistics

REDCOM's average traffic volume and CIM rate are not available at this time.

The majority of incoming messages are received and routed automatically by the FARM software. The bulk of these messages are routed directly to the MAXI system for delivery to various USREDCOM and USCENTCOM users.

Future Operations

When the CSP Remote Communications Center Capability is completed, CENTCOM will utilize their OJ-389 terminal as a full communications terminal with CSP separating the traffic destined for CENTCOM from that destined for REDCOM. Also, outgoing traffic will be segregated by OSRI to determine release authorization and error correction.

Site Personnel

The CUBIC/CSP on-site representative at LANTCOM is Mr. Richard Arab, PRC. Mr. Arab works closely with both the data processing and communications staffs of USREDCOM and USCENTCOM in his daily operations. His primary point of contact is REDCOM/J2-PR.

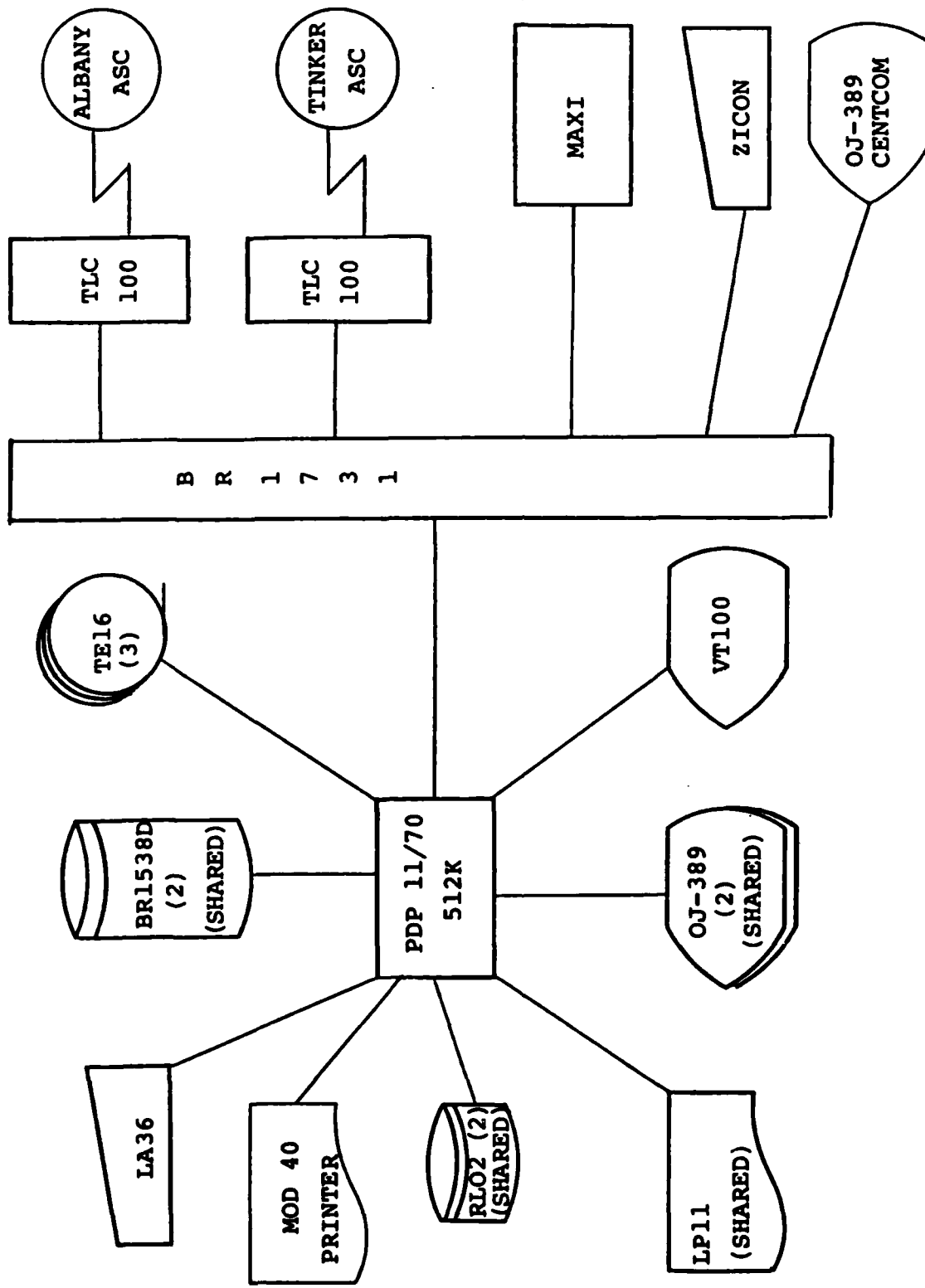


Figure A-18 REDCOM Connectivity Diagram

USAREUR, Heidelberg, Germany

Site Location

CSP was installed at HQ US Army Europe (USAREUR), Heidelberg Germany in January, 1983 and is being operated by U.S. Army data processing personnel. It is located in three relocatable vans and is designed for use in a tactical environment.

CSP's primary mission at HQ USAREUR is to provide continuous message handling support for the Relocatable Army Processors for Intelligence Data Europe (RAPIDE). RAPIDE is the intelligence automation upgrade that is specifically designed to meet the needs of the Echelon-Above-Corps (EAC) intelligence mission in peacetime, crisis and war. The goal of RAPIDE is to help intelligence operations by getting needed messages to the correct analyst more quickly, giving analysts access to all required information, providing decision aids to help synthesize the data, and helping the analyst produce more product in a given time.

Equipment Configuration

The CSP at USAREUR is currently implemented on the following hardware for the primary system:

- o CPU - One (1) PDP-11/70 with 960K memory
- o System Console - One (1) LA36 DECWRITER
- o Disk drives - Five (5) BR1538B
- o Tape drives - Two (2) TE16
- o Multiplexer - One (1) BR1569
- o Line printer - One (1) LP11RA
- o AUTODIN Interface Device - One (1) TLC100
- o Message Distribution Console - One (1) OJ-389
- o Other Equipment - One (1) VT100 terminal
One (1) TLC100 for MAXI link

There is no backup system per se at USAREUR. There is however another van available with similar equipment that can be used in the event that the primary CSP equipment is down.

Software Configuration

Figure A-19 contains a site report extracted from Informatics Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation and a status of pending releases. Also included are any site-unique modules developed for this particular site.

Communications Configuration

The USAREUR CSP is single-homed with a link to Pirmasens ASC. The backside computer interface at USAREUR is a standard MAXI but it is configured with back-to-back TLC100s to provide synchronous communications and message transmission control.

A connectivity diagram for USAREUR is presented in Figure A-20.

Current Operations Statistics

USAREUR's average traffic volume and CIM rate are not available at this time. The average traffic volume is not very high but the site is equipped to handle a large increase in volume as a result of contingency situations.

Most incoming messages are automatically or derivatively routed, with a small amount being handled by the message distribution clerk.

Future Operations

There are plans to replace the current PDP 11/70 van mounted system with a PDP 11/44 in a larger trailer. This would also involve upgrading the BR1538B disk drives to the newer DEC RA60 disks. Another enhancement foreseen is to dual-home to Pirmasens and Croughten ASCs which would provide more reliability.

Site Personnel

There is no full-time on-site support representative at HQ USAREUR. Part time support has been provided at the rate of one-third time. The CUBIC/CSP on-site representative providing this service is Mr. Eric Bruno who is based at Ramstein AB, Germany. The additional support has been provided over the telephone by Mr. Bruno. Mr. Bruno works closely with the systems staff of USAREUR in his daily operations. His primary point of contact is HQ USAREUR/ODCSI-SYS.

SITE: USAREUR (UR)

RELEASE: 2.3A

STATUS: OPERATIONAL 01-SEP-83

DATE OF INSTALLATION: 01-SEP-83

REMARKS: NONE

UNIQUE MODULES:

NONE

OUTSTANDING PROBLEM REPORT:

NONE

Figure A-19 USAEUR Configuration Status

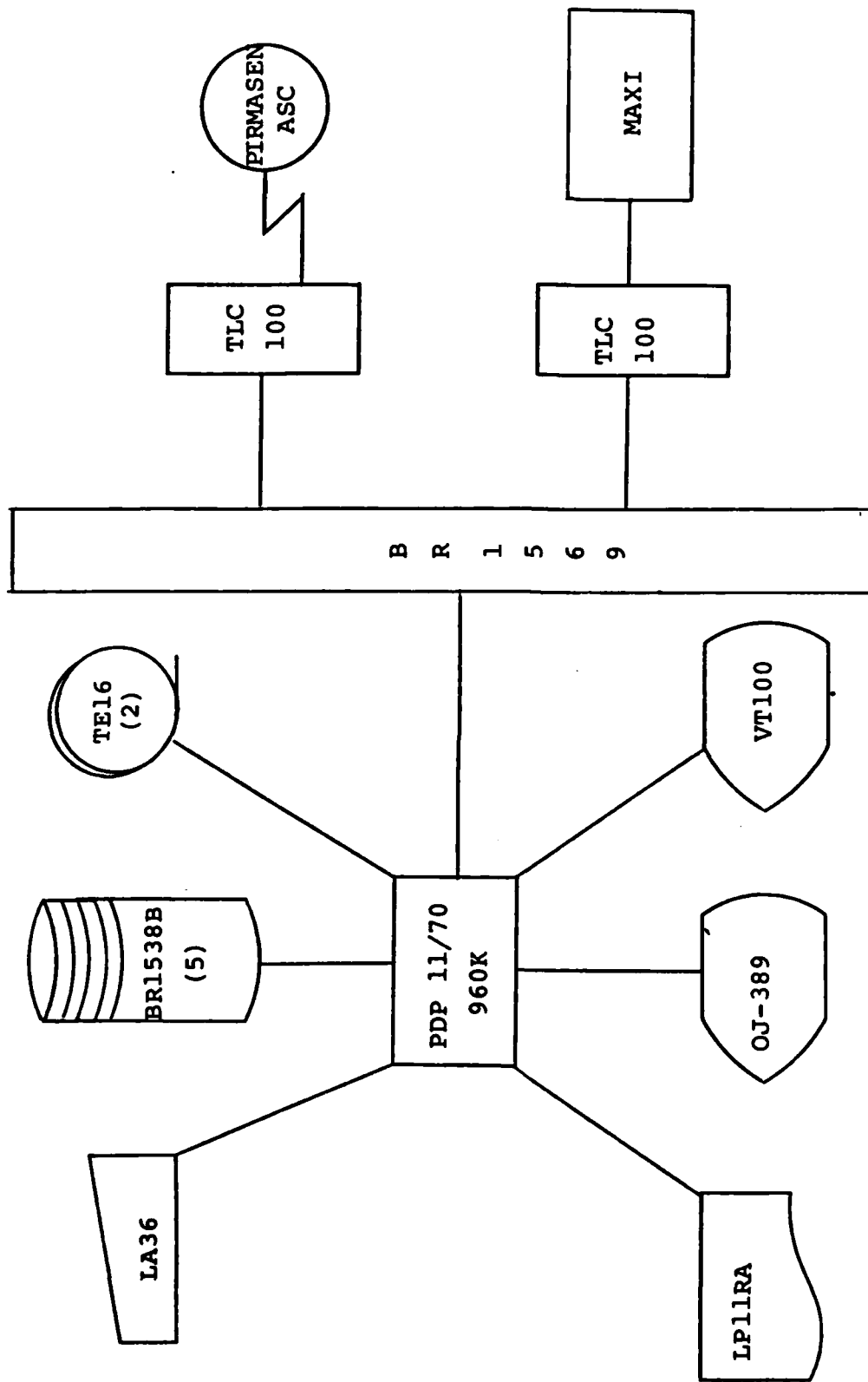


Figure A-20 USAREUR Connectivity Diagram

USAFE TFC, Germany

Site Location

CSP was originally installed at HQ USAFE Tactical Fusion Center (TFC), Germany in April, 1983 as part of the Operational Applications of Special Intelligence Systems (OASIS) project. It was installed by another contractor under contract to ESD. In July, 1983 it was upgraded to a later release of CSP software and accepted by the government. In September 1983, Informatics, as part of the CUBIC program reinstalled CSP release 2.3 baseline software but maintained the site-unique CSP/MAXI interface installed by the original contractor. This software is currently undergoing evaluation by Informatics.

CSP provides continuous message handling support for the OASIS project. It provides the Tactical Fusion Center with access to the AUTODIN network and interfaces to the MAXI system for analyst support.

Equipment Configuration

The CSP at the TFC is currently implemented on the following hardware for the primary system:

- o CPU - One (1) PDP-11/70
- o System Console - One (1) LA36 DECwriter
- o Disk Drives - Three (3) BR1538D
- o Tape drives - Two (2) TE16
- o Multiplexer - One (1) BR1731
- o Line printers - One (1) LP11
- o AUTODIN Interface Device - One (1) Analytics TLC100
- o Message Distribution Console - One (1) OJ-389
- o Other Equipment - One (1) VT100 terminal
One (1) PCL11-B Communication Device

The backup system is configured almost identically to the primary.

Software Configuration

Figure A-21 contains a site report extracted from Informatics Configuration Management System. This report reflects the current software release level for this site, the date of software installation and implementation and a status of pending releases. Also included are any site-unique modules developed for this particular site.

Communications Configuration

The USAFE TFC is single-homed with a link to Pirmasens ASC. The backside computer interface at the TFC is configured as a MAXI system interfaced through a PCL11 interface device using the Inter Computer Communications (ICC) Gateway software. This ICC software also inter-connects two other processors which include IDHSC-II and OPSCOM capabilities.

A connectivity diagram for the TFC is presented in Figure A-22.

Current Operations Statistics

The average traffic volume and CIM rate for the USAFE TFC are not available at this time. Incoming messages are automatically or derivatively routed to the MAXI system. A small percentage of messages are handled by the message distribution clerk.

Future Operations

The current ICC/PCL11 interface to MAXI is being evaluated for possible incorporation into the baseline. It is anticipated that this capability will not be baselined but rather treated as a site unique interface. If possible, this interface will be replaced by a standard CSP/MAXI gateway at some point in the future.

Site Personnel

The CUBIC/CSP on-site representative at LANTCOM is Mr. John Konopik, Informatics. Mr. Konopik works closely with both the HQ USAFE TFC staff in his daily operations. His primary point of contact is 7011 CSF USAFE/ADW.

SITE: USAFE TFC (TF)

RELEASE: 2.2C2

STATUS: OPERATIONAL 15-JUN-83

DATE OF INSTALLATION: 21-OCT-83

REMARKS: RELEASE 2.3 WAS INSTALLED AND IS BEING TESTED PRIOR TO ON-LINE OPERATION.

UNIQUE MODULES:

NONE

OUTSTANDING PROBLEM REPORT:

NONE

Figure A-21 USAFE TFC Configuration Status

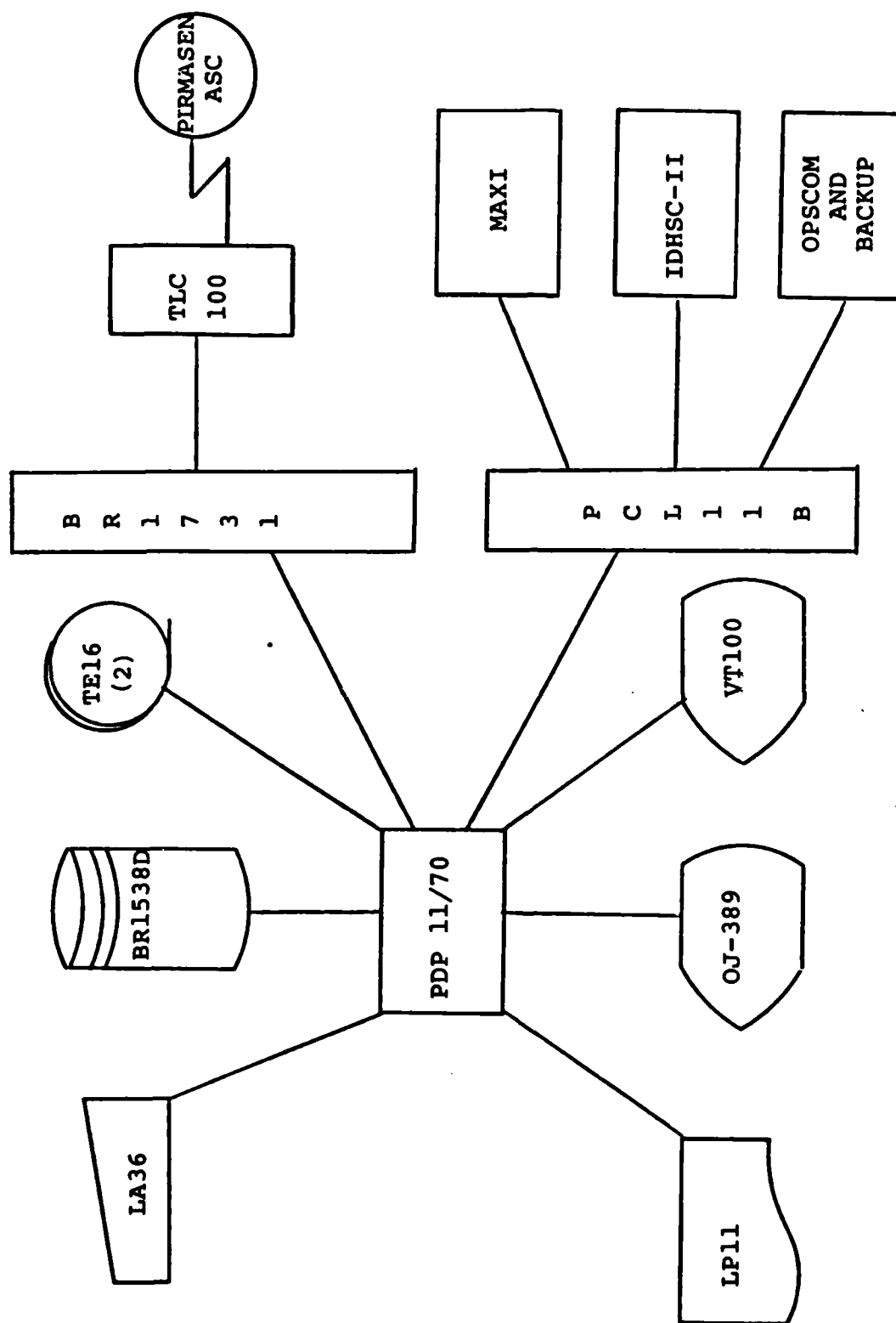


Figure A-22 TFC Connectivity Diagram



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